An Evaluation of Determinants that Influence Decisions to Adopt School-Based Dental Sealant Programs by Principals in Elementary Schools in Georgia that Predominantly Serve Low-income Children

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ABSTRACT

James C. Howgate: An Evaluation of Determinants that Influence Decisions to Adopt School-Based Dental Sealant Programs by Principals in Elementary Schools in Georgia that Predominantly Serve Low-income Children
(Under the direction of Alex White and Rebecca Slifkin)

About one in five children aged 5 to 11 years have at least one untreated, decayed tooth (Dye, Li, & Beltran-Aguilar, 2012) and tooth decay is the number one chronic disease in children (S. O. Griffin, Wei, Gooch, Weno, & Espinoza, 2016). More than 51 million school hours are lost each year due to dental health issues, making it the number one reason for missed school (Gift, Reisine, & Larach, 1992). Additionally, studies show that poor oral health is associated with lower school performance (Blumenshine, Vann, Gizlice, & Lee, 2008; National Maternal and Child Oral Health Resource Center/Georgetown University, 1996; Satcher, 2000). Conversely, school attendance and performance by children are positively affected by good oral health (S. O. Griffin, Shillpa, Scherrer, Patel, & Sajal, 2017; S. Griffin et al., 2016; Reisine & Reisine, 1985; Seirawan, Faust, & Mulligan, 2012; United States General Accounting Office, 2003).

The American Academy of Pediatric Dentistry states that tooth decay is the most preventable disease in children (The American Academy of Pediatric Dentistry, 2014). Preventive oral health services such as sealants are a cost-effective intervention when compared to costs of treating caries (S. Griffin et al., 2016). Additionally, school-based sealant programs (SBSP) are cost-effective (S. Griffin et al., 2016; Zabos et al., 2002) and are a recommended delivery mechanism (The Guide to Community Preventive Services, 2017) for dental sealants. Despite these facts, most elementary schools in Georgia do not have school-based sealant programs.

This study identified factors that influence the SBSP adoption decision by elementary school principals in Georgia. Semi-structured key informant interviews were conducted with 18 elementary school principals, six of whom hosted SBSP, and 12 of whom did not. Principals were found to be very aware of the needs of and were concerned with the well-being of the children they serve. In those

principals not currently hosting SBSP, there was a total lack of awareness of SBSP, which was a critical barrier to adoption. The processes and authorities for program adoption decision-making include principals, but generally reside at or at a minimum include the school district. Public health is a major contributing factor to the presence of SBSP in elementary schools in Georgia.

To Jill, my rock.
To my father, whom I wish were here share in this with me.

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LIST OF ABBREVIATIONS

AAP	American Academy of Pediatrics
AAPD	American Academy of Pediatric Dentistry
ADA	American Dental Association
ASTDD	Association of State and Territorial Dental Directors
CDC	The Centers for Disease Control and Prevention
CHC	Community Health Center
CHIP	Children's Health Insurance Program
CMO	Care Management Organization (AKA MCOs)
CMS	Centers for Medicaid and Medicare Services
CPSTF	The Community Preventive Services Task Force
DCH	Georgia Department of Community Health
DHPSA	Dental Health Professional Shortage Areas
DSL	Dental Screening Law
EBP	Evidence Based Practice
ESEA	Elementary and Secondary Education Act of 1965
FMRP	Fluoride Mouth Rinse Program
FPL	Federal Poverty Level
FQHC	Federally Qualified Health Center
GADPH	Georgia Department of Public Health
GDOE	Georgia Department of Education
GOSA	Governor's Office of Student Achievement
GPHDP	Georgia Department of Public Health Dental Program
HHS	Department of Health and Human Services
HP2020	Healthy People 2020
HRSA	Health Resources and Services Administration
IRB	Institutional Review Board

KII	Key Informant Interview
NCHS	National Center for Health Statistics
NGO	Non-Governmental Organization
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NIH	National Institutes of Health
NSDPHMS	National Study on the Diffusion of Preventive Health Measures to Schools
PCK	PeachCare for Kids®
PI	Principal Investigator
PRPL	Free and Reduced Priced Lunch Program
SBHC	School-based Health Centers
SBSP	School-based Sealant Program
SES	Socio-Economic Status
The Community Guide	The Community Guide to Preventive Services
USPSTF	US Preventive Services Task Force
WHO	The World Health Organization

CHAPTER 1: THE TOPIC

Background

In 1948, the World Health Organization (WHO) published their definition of health as the "complete state of physical, mental, and social well-being and not merely the absence of infirmity (World Health Organization, 2014)." This statement is often quoted and has more recently been coopted to include oral health. According to a report released in 2000 by the US Surgeon General Dr. David Satcher, "Oral health means more than healthy teeth and the absence of disease. It involves the ability of individuals to carry out essential functions such as eating and speaking as well as to contribute fully to society (Satcher, 2000)." According to a subsequent Surgeon General report (Benjamin, 2010), "Dental caries is the most common chronic disease in children" and is about five times as common as asthma. A PEW report on state oral health policies in 2007 indicated that one out of five children between the ages of 1 and 18 enrolled in Medicaid in the United States went without dental care (The Pew Center on the States, 2010).

Oral health has physical and psychological effects which can affect quality of life and feelings of social well-being. Severe caries in children can cause discomfort and pain and can lead to disfigurement, infections and disruptions in eating and sleeping. In extreme cases caries can lead to higher risk of hospitalization, which results in higher treatment expenses and other indirect costs including lost work days for caregivers and missed days in school for the child (Sheiham, 2016). An analysis using National Health Interview Survey (NHIS) data estimated 51 million school hours per year are lost nationally because of dental-related illnesses (Gift et al., 1992). In addition to absenteeism, studies show that poor oral health is associated with decreased school performance, because children who are forced to endure oral pain are distracted and unable to concentrate on schoolwork (Satcher, 2000; United States General Accounting Office, 2003). One study showed that students who suffer from toothaches are approximately four times more likely to have a low grade point average (Seirawan

et al., 2012). Studies on academic performance, particularly as they relate to complications from poor oral health, have limitations in that the nature and severity of dental problems are not always well documented.

Statistics demonstrate differences in dental health outcomes for different populations. A CDC report analyzing National Health and Nutrition Examination Survey (NHANES) data from 1999–2004 showed that low-income children are twice as likely as higher-income children to have untreated caries (27% vs. 13%) and half as likely as higher-income children to have dental sealants (21% vs. 40%) (S. O. Griffin et al., 2016). Children who live at less than 200% of the federal poverty level (FPL) are two times or more as likely to have untreated caries compared to children from families with incomes greater than 200% of the federal poverty level (Dye et al., 2012).

The Georgia Department of Public Health (DPH) reported in 2014 that the prevalence of tooth decay is 50% higher for children with lower socio-economic status (SES), when compared to children in higher SES; in Hispanic children rates of tooth decay were 64% as compared to non-Hispanic at 50%. Rates were higher in rural areas versus in non-rural (Kabore HJ, Smith C, Bernal J, Parker D, Csukas S, 2014). A comprehensive analysis of need conducted at the census tract level in Georgia found that the average met need for low-income children (≤ 247% FPL) was 59% and for high-income children (≥ 400% FPL) it was 96%. In rural census tracts, the number shifted disparity even wider at 33% and 84% respectively (Cao, Gentili, Griffin, & Griffin, 2017).

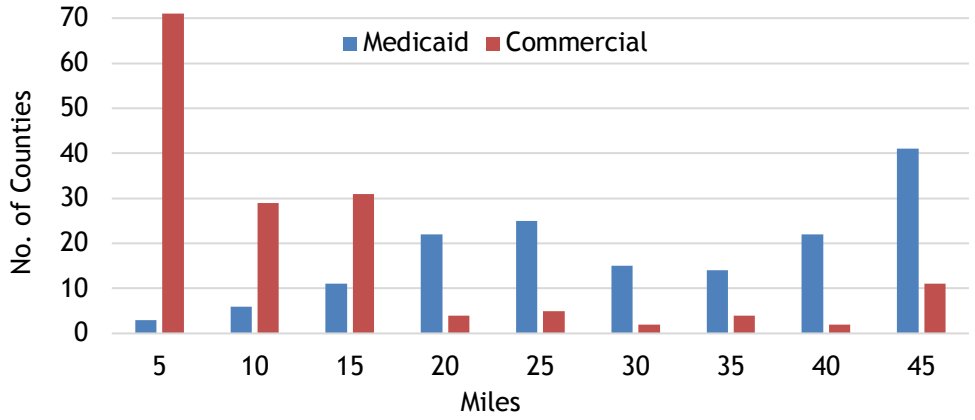
Access to Care

Having dental insurance, particularly public coverage from Medicaid or Children's Health Insurance Program (CHIP) does not guarantee access to oral health care. According to a 2009 survey conducted by the Centers for Medicaid and Medicare Services (CMS), identifying a dentist who accepts Medicaid was the most frequently reported barrier to children obtaining dental services. Recent data (2016) from the American Dental Association Health Policy Institute ranked Georgia 45th in the nation in the number of dentists per capita with only 46.6 per 100,000 population (N = 4,811 total dentists practicing). Their data further demonstrated that only 28.4% of Georgia's 4,811 licensed dentists (N = 1,422) accept public insurance for children. With 1.5 million (58%) children in Georgia qualifying for

public dental benefits through the state's Medicaid and CHIP (PeachCare for Kids© (PCK)) programs (Cao et al., 2017), there exists a substantial "spatial access" problem to dental care for children.

The Georgia Institute of Technology, Center for Health Analytics describes this spatial access in two dimensions, (1) accessibility, or distance to the provider and (2) availability or scarcity of providers who accept Medicaid ("The Georgia Institute of Technology Center for Health Analytics," n.d.). Figure 1 compares the travel distances by county for the pediatric population (age 0-19 years) in Georgia to dental care for those on Medicaid and those that have private insurance. Eighty-five percent of those on commercial insurance traveled fewer than 25 miles, compared to Medicaid where 75% traveled 25-

Figure 1: Estimated Travel Distance per County for the Child Population (0-19) to Reach Dental Care Providers (N=159)



45 miles. Another analysis looking at the census tract level in Georgia showed that children from high-income families had better access to preventive dental care than children from lower income (Cao et al., 2017). Current data from the Health Resources and Services Administration (HRSA) designates 41 out of 159 counties in Georgia as dental health professional shortage areas (DHPSA) (Appendix 3) and the American Dental Association (ADA) ranks Georgia at 49th in the nation in terms of access to dental health care (Georgia Health Policy Center, 2012).

Children receiving public insurance have fewer dentists to choose from and travel farther to see a provider than those on commercial insurance, however there are many children in Georgia who do not have any health insurance. The Georgetown University Health Policy Institute, Center for Children and Families ranked Georgia seventh in the nation in the rate of uninsured children 0 to 19

years of age. The report states that more than 40% of the nation's uninsured children reside in just four states, one of which is Georgia (Alker & Pham, 2016). Referencing US Census Current Population Survey (CPS), Annual Social and Economic Supplement data, there were an estimated 215,000 uninsured children in Georgia in 2017. This total was in decline from 2014 but saw a sharp increase in 2017.

Table 1: Numbers of Uninsured Children (0-19) in Georgia, 2014-2016 (in thousands)

Year	2014	2015	2016	2017
N	232	220	195	215
%	8.5	8.1	7.0	7.6

Data Source: Current Population Survey, Annual Social and Economic Supplement, U.S. Census Bureau

Dental Sealants

Dental sealants, or pit and fissure sealants, are a thin coating of either resin or glass ionomer-based material that are painted on the biting surfaces of teeth to fill in pits and fissures on the occlusal surface. Dental sealants prevent bacteria from becoming trapped in the pits and fissures in teeth, rendering teeth less vulnerable to tooth decay. Sealants have been approved for use for many years (American Dental Association, 2014; Beauchamp et al., 2014) and are a recommended intervention by professional associations (www.ada.org) and the public health community (www.apha.org). They are mainly used in children who are at higher risk of tooth decay and can prevent cavities for up to nine years. Sealants prevent the most cavities when applied soon after permanent molars erupt. First molars appear generally around the age of six (first grade), and second molars erupt at approximately the age of 12 (fifth grade). The earlier sealants are applied after teeth erupt, the more preventive benefit the recipient will realize. Considering the duration of sealant efficacy of nine years, if sealants were provided to the 6.5 million low-income children currently without sealants in the U.S., over 3.5 million cavities would be prevented across the nation, according to an analysis conducted by the CDC using National Health and Nutrition Examination Survey (NHANES) data (S. O. Griffin et al., 2016).

Recent data from the National Center for Health Statistics (NCHS) illuminate a variability in the application of sealants across different demographic populations. The prevalence of dental sealants in

children aged 5–19 years was highest among non-Hispanic whites (30.2%) compared to 23% in Mexican Americans and 17% in non-Hispanic blacks. There was a significant difference in sealant prevalence in children living below 200% of the federal poverty level (19.7% - 21.0%) compared with those living at or above 200% of the federal poverty level (32%). Data indicate that the number of children who receive sealants is increasing, however low-income children are still 20% less likely to have them and twice as likely as higher income children to have untreated caries (Centers for Disease Control and Prevention, 2016). Effective application of dental sealants in the children with the greatest need should be part of a comprehensive solution to addressing dental health disparities in children.

School-based Sealant Programs

The Community Preventive Services Task Force (CPSTF) recommends that school-based programs deliver dental sealants to prevent caries and tooth decay among children, because they "increased the proportion of students who received sealants and decreased occurrence of tooth decay." The Task Force recommendation was based on a review of the literature that showed "strong evidence of effectiveness" of SBSP. Children who receive a dental sealant in a school-based program have 60% fewer cavities when compared to children who did not receive a sealant (Truman et al., 2002). Additionally, schools with dental sealant programs increase the prevalence of sealants in third graders up to three times greater when compared with students in schools without sealant programs (Centers for Disease Control and Prevention, 2001).

A systematic review of economic evaluations conducted for CPSTF of school-based sealant programs found that the benefits of SBSP exceed their cost when they serve children at high risk for tooth decay, saving as much as $11.70 per tooth sealed over 4 years (S. O. Griffin et al., 2016). Another CDC evaluation indicated that using school-based programs that provide sealants to roughly 7 million low-income children who lack them could save up to $300 million in dental treatment costs (Centers for Disease Control and Prevention, 2016). A 2016 study projected that an SBSP that served 1,000 children will prevent the need for 485 dental fillings (S. Griffin et al., 2016).

The US Department of Health and Human Services recently modified a Healthy People 2020 (HP 2020) goal, specifically OH-9.1 - Increase the proportion of school-based health centers with an oral

health component that includes dental sealants by 10 percent from the 2007–08 baseline year of 17.1% to the new target of 18.8%. This clearly indicates an awareness of and support for the value of dental sealants provided in a school setting. Because SBSPs take a population based approach to risk assessment for caries, they "may increase the oral health status of the community and decrease school absenteeism due to dental problems (McCormack-Brown, Clark, & McDermott, 1989)."

Given the spatial access barriers to dental care that exist with Georgia's children and the preventive benefits from sealants when applied appropriately; alternative, effective approaches for sealant delivery should be a priority for entities who are concerned with addressing the dental health of children. The application of sealants can be conducted in non-traditional community settings, including schools, using portable dental equipment. In Georgia, sealants can be applied by dental hygienists under general supervision rules, which means under stated criteria a dentist is not required to be present for the procedure. Under Georgia Dental Board rule 150-5-.03. Supervision of Dental Hygienists, the requirement of direct supervision of a dentist over a hygienist does not apply to "dental hygiene duties at approved dental facilities of the Department of Public Health … or the performance of dental hygiene duties by personnel of the Department of Public Health or county boards of health at approved off-site locations", which includes sealant application at a school. Paragraph 7 of the same section states it "shall be in the sole discretion of the authorizing dentist to require an initial examination of the patient prior to the performance by a dental hygienist of dental hygiene services under general supervision." According to the Department of Public Health Dental Program Director, this rule is applied in a consultative fashion with the county Boards of Health that have public health SBSP and it is at the discretion of the supervising dentist as to how they clinically manage the hygienists' provision of services.

Determining Need

To better target schools, dental programs that deliver in-school services in Georgia choose between two methods that demonstrate the level of need in the student population. Through interviews with program staff of the aforementioned for-profit mobile dental provider, they target schools with demonstrated need through a program known at Title 1 created by the Secondary

Education Act of 1965 (ESEA). This federal program makes funds available through state Departments of Education to local schools with high proportions of low-income students to improve academic achievement. The second approach, which measures the school's participation level in the US Department of Agriculture (USDA) Free and Reduced-Price Meal (FRPM) program is utilized by the GPHDP to target schools for their SBSP. At the state level, the FRPM program is administered by state agencies which operate through agreements with local school authorities. Children qualify for free or reduced-price school meals based on household income and family size, guidelines for which are published every year by the Georgia Department of Education (GDOE). The target participation threshold for Georgia Public Health Dental Program is 50% or greater FRPM enrollment. In 2018, according to data retrieved from the GDOE, there were 965 out of 1,323 elementary schools (73%) that had greater than 50% FRPM participation, which indicates a substantial opportunity to address unmet dental health need in a school-based setting across Georgia.

Identifying a dentist who accepts Medicaid is the primary barrier to accessing dental care for covered children and there are documented spatial access issues to dental care for Georgia's publicly insured and uninsured children. Because sealants are efficacious, cost-effective — particularly when provided to the neediest children — and can be applied in non-traditional settings such as schools, expansion of SBSP in Georgia's schools could provide an opening to broadly advancing the prevention of dental health issues in needy children. Too many children go without the preventive services that would reduce the incidence of caries and consequently reduce school absenteeism. There is a clear opportunity to expand the adoption of SBSP across the state. Given what is already known about the effectiveness of school-based sealant programs and the need for access to these preventive services in Georgia, this research analyzed determinants that influence the decision to adopt school-based sealant programs in public elementary schools in Georgia.

Conceptual Framework

Sealants have been proven to be both a clinically and cost-effective method for improving dental health outcomes in children, yet SBSP have not been widely adopted in Georgia. This research project sought to understand the determinants that influence the decision to adopt a beneficial,

preventive dental health program in elementary schools in Georgia. For clarity, determinants are "factors that obstruct or enable changes in targeted professional behaviours or healthcare delivery processes" and are referred to as "barriers and enablers", "barriers and facilitators" and also "problems and incentives (Krause et al., 2014)." For consistency, this study used the terms "determinants", "facilitators" and "barriers".

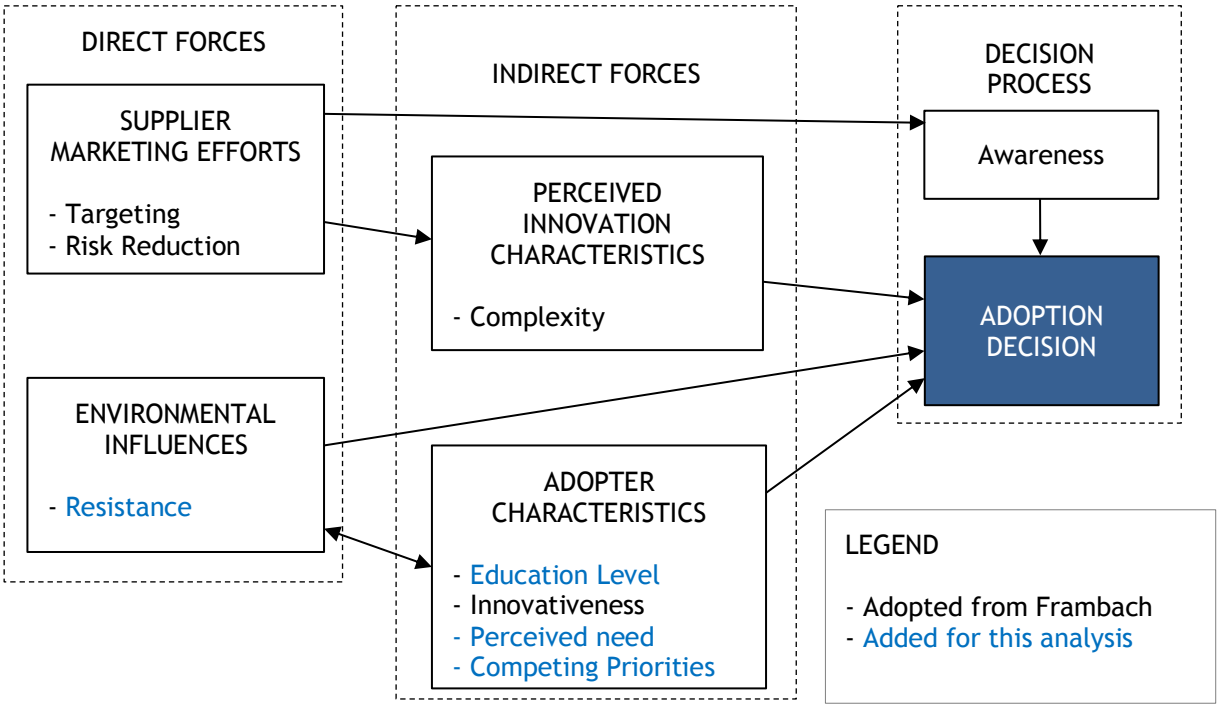
Decisions to adopt programs that delivery health services in schools are influenced by a collection of determinants, some emanating from the merger of a disease prevention program rightly perceived as non-educational into an education setting, though it would prevent absenteeism and improve academic performance. In Georgia there are over 180 independent public-school systems, each with a contextually unique decision process for adoption influenced by a set of determinants which may have both common and unique components based on each school's individual circumstances. Understanding the complex mix of determinants that influence the adoption decision of SBSP in individual elementary schools informed possible solutions for expanding into more schools across Georgia.

To facilitate organizing the complexity of the potential determinants in question, the conceptual framework developed by Frambach and Schillewaert (2002) on organization innovation adoption was selected with several modifications described below. Frambach et al. defines adoption as "the decision of any individual or organization to make use of an innovation" and further describes an adoption process as "a sequence of stages a potential adopter of an innovation passes through before acceptance of a new product, service or idea (Frambach & Schillewaert, 2002)." This research focused on the organizational adoption decision using the school principal as a proxy for understanding the decision process. The authors of this framework also describe the influence of determinants on the decisions to <u>not</u> adopt, which was a feature that factored in data collection for those schools that may have declined when offered the opportunity to adopt an SBSP, however no schools that participated that did not currently host a program had ever been approached to adopt an SBSP.

The organizational level framework is divided into sets of direct factors, including supplier marketing forces, social networks and environmental influences, and indirect forces which are comprised of perceived innovation characteristics and adopter characteristics. Figure 2 graphically

depicts these groupings, with perceived innovation characteristics and adopter characteristics at the core of the framework as according to Frambach they propel the decision-making process, but they are also influenced by and mediate external factors. There is plausibly a mixture of determinants from both direct and indirect forces in the SBSP adoption decision process for an elementary school. Determinants selected from the Frambach framework as most applicable to the aims of this research include **targeting**, which is the influencer's ability to effectively make a case for the innovation adoption; **risk reduction**, the supplier's ability (or adopter's perception of their ability) to mitigate the potential real or perceived impacts to the school; **complexity,** defined as the school's attitude, perception or opinion of the innovation and finally **innovativeness**, or the degree to which a school's culture is receptive to new products or services. Additionally, the decision process determinant **awareness** was retained as a necessary condition of adoption.

Figure 2: Conceptual Framework Adopted from Frambach, et al (2002)



Research on implementation has mainly been advanced in areas where adoption is propelled by profit or science (Aarons & Hurlburt, 2011). Frambach and Schillewaert researched the adoption of innovation by organizations in the private sector and describe markets driven by profit. Schools are not

a “market” in the same sense in that the organization is not driven by financial gain as an adoption criterion. Other research shows that adoption of innovations in human services organizations (i.e. schools) is “fundamentally different” from traditionally studied innovation adoption settings due to the types of innovations and the variability in the characteristics of the those receiving the innovation (Damanpour, 1991).

Table 2: Definitions of Innovation Adoption Determinants

DETERMINANT	APPLICABILITY TO ANALYSIS
Targeting	How well the SBSP does in making the case to adopt a new program.
Risk Reduction	The effect of the SBSP taking the risk of conducting the entire program away from the school.
Complexity	The principal’s attitude towards the program including effectiveness, cost, funding availability and the degree of difficulty to conduct a program.
Innovativeness	A principal’s predisposition to attempt new advances.
Awareness	A condition necessary for the adoption decision to occur which can be influenced by targeting.
Resistance*	The degree to which internal and external individuals or entities negatively influence the decision to adopt.
Perceived Need*	The level of influence of the principal’s felt need for an intervention, possibly based on poverty level or knowledge of disease burden.
Competing Priorities*	The level of influence of the principal’s lack of motivation to adopt, possibly based on limited resources, external or internal pressures.
Education Level*	The highest degree achieved and the topic of research for the degree if applicable.

*Added to Frambach’s framework for this analysis.

To address this dissonance between the research and its application to an alternative setting, the selected framework has been modified to include four additional determinants not expressly described by Frambach, which include the potential motivation influenced by **competing priorities** at the school level, i.e. lack of motivation to adopt, possibly based on real or perceived lack of time or other resources; the **perceived need** by the school for the intervention, i.e. deciders inference that an intervention is needed based on an awareness of the need characteristics of their student body and finally potential **resistance** to the status quo to adoption by internal or external parties. Finally, in other studies of adoption decisions of a different preventive dental intervention in schools, a

correlation was demonstrated between the likelihood to adopt and the decider's **education level**. Table 2 contains the selected determinants and a description of how they potentially apply to a principal's decision to adopt SBSP.

Research Question and Study Aims

The intent of this study was to answer the question; **what are the determinants that influence the decision of an elementary school principal in Georgia that predominantly serves low-income children to adopt a school-based dental sealant program?** This is a decision that could lead to implementation of a school-based health program that prevents a chronic dental issue in children and would have a positive effect on school attendance and academic performance.

The approach was divided into three aims. Aim 1 was to understand current types and characteristics of other school-based dental health programs in Georgia's elementary schools. Aims 2 and 3 were to evaluate determinants that influence an elementary school's decision to adopt or not adopt an SBSP, respectively. The chosen conceptual framework inspired by Frambach (Figure 2) organizes the research approach and the content of Aims 2 and 3 are refined to focus on the determinants defined in Table 2. The research questions for Aims 2 and 3 were mapped to the conceptual framework, which were also mapped to the questions in the approved interview guide (Appendix 4).

Aim 1

> **Describe the number of school-based dental programs that are currently being conducted and the volume of services being provided in public elementary schools in Georgia.**

This aim provided meaningful information about the distribution and characteristics of other school-based dental programs in Georgia. The results have facilitated an understanding of the various types of programs in place that serve predominantly low-income children. Originally, it was thought the results of this Aim may contribute to more precise sampling of schools for Aims 2 and 3, but this did not turn out to be the case due to recruiting issues described in detail in Chapter 3.

Research Questions

- Which elementary schools in Georgia have had a school-based dental program in the past 12 months?
- What other types of service delivery models were deployed (mobile practice, public health, other)?
- What provider types conducted the services (dentist or hygienist)?
- What dental services were performed by the provider?
- What were the methods used by the provider to target the schools in which the services were provided?
- How many children were served?
- How were they funded?

Method – Quantitative and descriptive analyses of publicly available data sources, including program data from the Georgia Dental Health Program and Medicaid claim data; unstructured discussions with the Georgia public health dental program and operations staff from other dental programs that provide services in schools. Where available, claim data from the state Medicaid program were used to describe provider's activities.

Aim 2

Collect and analyze determinants that influence an elementary school's decision **to adopt** a school-based sealant program (SBSP) in public elementary schools in Georgia that predominantly serve low-income children.

Research Questions

1) **Targeting** – Did an outside health entity or person make the school aware of SBSP and the benefits of conducting an SHBP in their school? If not a health entity, what other entity or person? Was there a 'champion' for the program that influenced the process?
2) **Risk Reduction** – How influential in the decision was the offerer of the SBSP carrying the major burden of effort and minimizing the programmatic responsibilities to the school?
3) **Resistance** – Were there external or internal individuals or entities exerting pressure on the

decision? If so, who were they and to what degree did each play a role in the decision-making process?

4) **Complexity** – What are the deciders attitudes towards the program including perceived effectiveness, cost, funding availability and the degree of difficulty to conduct a program?

5) Perceived Need – To what degree were the deciders motivated by a perception that an intervention was necessary, possibly based on poverty level or knowledge of disease burden?

6) Innovativeness – Did the school have a predisposition to attempt new innovations? What are initial reactions when presented with new, extra-curricular programs for students?

7) Competing Priorities – Were there other activities or pressures that influenced a lack of motivation to adopt possibly based limited resources or other external or internal pressures.

8) **Education Level -** What is the highest degree attained by the principal of the school.

Method – Qualitative analysis of key informant interviews with school principals that have hosted a school-based sealant program in their school in the past school year.

Aim 3

Collect and analyze determinants that influence an elementary school's awareness of or decision to **not adopt** a school-based sealant program (SBSP) in public elementary schools in Georgia that predominantly serve low-income children.

1. **Awareness** – To what degree were principals who have not hosted a program aware of School-based Sealant Programs?
2. **Targeting** – Did an outside health entity or person make the school aware of SBSP and the benefits of conducting an SHBP in their school? If not a health entity, what other entity or person? Was there a 'champion' for the program that influenced the process?
3. **Risk Reduction** – How influential in the decision was the offerer of the SBSP carrying the major burden of effort and minimizing the school's programmatic responsibilities?
4. **Complexity** – What were the deciders attitudes towards the program including perceived effectiveness, cost, funding availability and the degree of difficulty to conduct a program?
5. **Perceived Need** – To what degree were the deciders motivated by a perception that an

intervention was necessary, possibly based on poverty level or knowledge of disease burden?

6. **Resistance** – Were there external or internal individuals or entities exerting pressure on the decision? If so, who were they and to what degree did each play a role in the decision-making process?
7. **Innovativeness** – Does the school have a predisposition to attempt new innovations? What are the initial reactions when presented with a new, extra-curricular programs for students?
8. **Competing Priorities** – Where there other activities or pressures that influenced a lack of motivation to adopt possibly based limited resources or other external or internal pressures.
9. **Education Level –** What is the highest degree attained by the principal of the school.

Method – Qualitative analysis of key informant interviews with school principals that have not hosted a school-based sealant program in their school.

CHAPTER 2: LITERATURE REVIEW

This chapter includes two sequential literature searches. The first systematic review focused on finding research that analyzed adoption determinants of SBSP in elementary schools, which resulted in no articles or studies expressly analyzing adoption decisions. Through bibliographic review, a reference was discovered for a study (Coombs, Silversin, Drolette, Bikofsky, & Ulrich, 1983) that explored adoption characteristics of a different school-based dental program from almost 40 years prior (McCormack-Brown et al., 1989). The second literature review was predicated upon this discovery and explored research on determinants influencing the adoption decision of school-based Fluoride Mouth Rinse Programs (FMRP). The intent of the second literature review was to ensure that critical information was not missed which could apply to the research question regarding SBSP adoption decisions.

Methods

The reviews were conducted between January 2018 and February 2019. The first review was designed to examine research that evaluated the existence and effects of determinants on the decision by an elementary school principal to adopt a school-based sealant program. The clinical efficacy and cost effectiveness of the intervention is well established in the literature, as well as the school-based method of delivery (Chalmers, 2011; S. Griffin et al., 2016; Muller-Bolla, Pierre, Lupi-Pégurier, & Velly, 2016; Zabos et al., 2002) and were therefore not terms of interest in the review. The following databases were accessed in one or both searches: (1) Medline (Ovid) from 1946-present, (2) Embase (Ovid) from 1947-present, (3) Global Health (Ovid) from 1910 - Present, (4) CINAHL (Ebsco), (5) ERIC (Proquest), (6) Scopus from 1960 – Present, and (7) Web of Science. Search terms for the intervention in the first review were limited to dental sealants (sealant, pit and fissure sealants). In the second review, terms related to fluoride mouth rinse and the diffusion of medical technologies were added to the search logic to ensure articles were captured that addressed the transfer of innovations into

schools. Terms for location were the same for both searches (elementary school, primary school, grade school) to capture first and fifth grade, the typical age when sealants are delivered in a school setting.

For a study to be included it had to be (1) published in English, (2) research conducted in schools within the United States, (3) in elementary schools in public or private settings, (4) qualitative or quantitative analyses of adoption decision characteristics, (5) descriptive or analytical, (6) irrespective of provider type (hygienist, dentist, other), (7) regardless of provider organization type (nonprofit, government, private, for profit). Exclusion criteria were (1) research not specific to adoption, (2) not published in English, (3) intervention not in the United States, (4) not sealants (or fluoride mouthrinse in the second search (e.g. education, screening, restorative)), (5) not school-based, (6) not elementary (primary) school age, (7) studies that focused on educational interventions to the students, (8) studies that focused on dental schools. Grey literature sources were not systematically excluded.

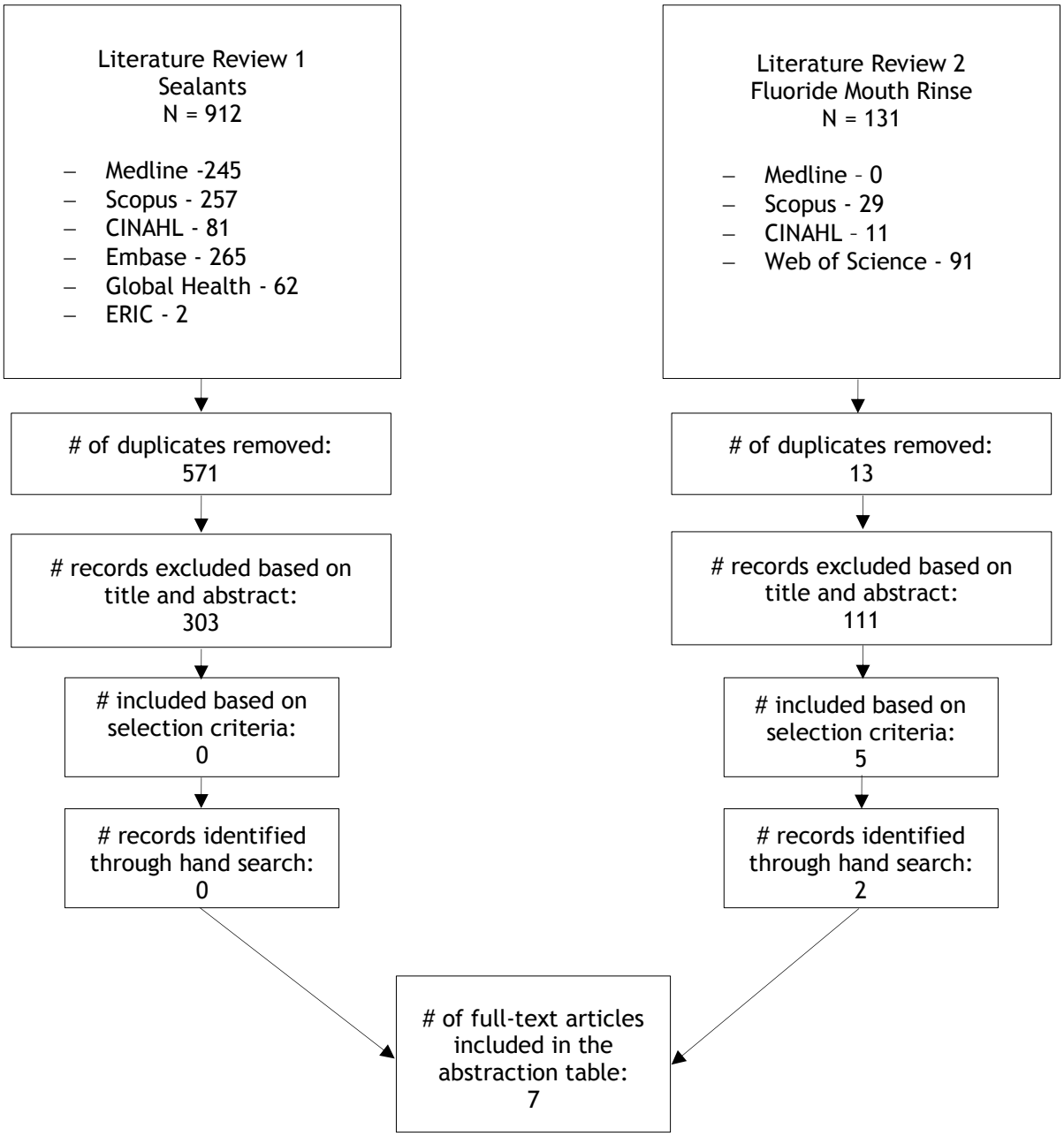
The searches were conducted with assistance from health sciences librarians at the University of North Carolina Chapel Hill (UNC) and the Stephen B. Thacker Library at the Centers for Disease Control and Prevention (CDC), however the eligibility assessment for selected articles was performed solely by the Principal Investigator. All files were imported into Mendeley desktop reference manager and deduplicated using automated "find duplicates" function with preference set to match on title, author and year. Full text of the articles that met the eligibility criteria were retrieved and reviewed using the eligibility criteria described above, based on content in the title and abstract first and subsequently in a full text review. A data extraction table was developed to assist with parsing the contents of the articles selected to be evaluated, which included, (1) lead author and year, (2) study design, (3) study population (4) sample size, (5) analytical methods, (10) author conclusions (7) and quality (Appendix 1).

Results

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) process was utilized (Liberati et al., 2009) for organizing and reporting the article selection and data collection process (Figure 3). The literature searches yielded a combined total of 1,043 articles that were

reduced to a total of 7 in the final abstraction. There were 912 potential sources from six databases from the first review from which 571 duplicates were removed. Following title and abstract review, 303 references were removed leaving 38 records for full-text review. All 38 references were excluded after application of eligibility criteria for reasons including not being research specific to adoption,

Figure 3: Combined PRISMA Diagram of Literature Review 1 and 2



being a clinical trial, an evaluation study, not US based or a cost-effectiveness study. The second systematic review yielded 131 articles from four online databases from which 13 duplicates removed. The number of eligible articles was reduced by 111 in the initial title and abstract review. Two articles were excluded after application of eligibility criteria and an additional two references were added from bibliographic review for a final total of 7 articles for abstraction.

Review 1 – School-based Sealant Programs

After application of eligibility criteria during the manuscript review no articles were determined to be peer-reviewed studies expressly focused on the analysis or evaluation of the impacts of determinants on the decision by an elementary school to adopt a school-based sealant program. All articles were found to be descriptive papers about sealants prevalence, cost benefit or effectiveness of sealant programs (11), informational articles (1), evaluations (5), program manuals (2). Nineteen articles mentioned or described the influence of various factors on the successful implementation or sustainment of an SBSP which included funding, planning, partnerships, school characteristics and program components, however, implementations and sustainment are not the focus of this analysis.

In the final sentences of one article, (McCormack-Brown et al., 1989) the authors quoted a study published five years ealier (Coombs et al., 1983) which stated that "…83% of superintendents whose schools adopted self-application fluoride rinse programs reported school health personnel positively influenced the adoption process." Upon exploration of this reference regarding adoption of an alternative school-based dental program, it became clear that an additonal literature review was necessary. The Coombs et al. article was not collected in the search strategy applied in the first reivew, most likely due to it being fluoride moutrinse and not dental sealants.

Review 2 – Fluoride Mouthrinse Programs

The 7 articles included in this review were published between 1980 and 1990, based on data collected by the National Study on the Diffusion of Preventive Health Measures to Schools (NSDPHMS) conducted in 1979. All 7 articles utilized surveys for their data collection method, five were mailed instruments (Coombs, Silversin, & Drolette, 1980; Coombs et al., 1983; Coombs, Silversin, Rogers, & Drolette, 1981; Deatrick & Sorg, 1982; J. B. Silversin et al., 1980a) and two used a telephone survey

method (Scheirer, 1990; Scheirer, Allen, & Rauch, 1987). Four specifically reported results from the NSDPHMS (Coombs et al., 1980, 1983, 1981; J. B. Silversin et al., 1980b), and two were designed as a follow-up telephone survey to the NSDPHMS (Scheirer, 1990; Scheirer et al., 1987). Three articles were published by the same three authors (Coombs et al., 1980, 1981; J. B. Silversin et al., 1980b) based on NSDPHMS data, although they did progressively elaborate on results from their survey. Results from the 7 articles in this literature review are organized by the study segment they described.

National Study on the Diffusion of Preventive Health Measures to Schools (NSDPHMS)

The NSDPHMS was conducted in the late 1970s through funding provided by the National Institutes of Health (NIH) (Coombs et al., 1980, 1983, 1981; J. B. Silversin et al., 1980a) and is central to the results of this literature review, as it was the genesis of all 7 selected articles. A published report of this study was not located, however the methods and results from the research are well documented in several of the selected references (Coombs et al., 1981; J. B. Silversin et al., 1980a). Coombs (1980) describes a "paucity of information related to adoption of preventive health measures in schools" and the study's theoretical framework drew heavily from Rogers' diffusion of innovation paradigm (E. M. Rogers & Shoemaker, 1971) which focused on the gap between the development of medical technology and the subsequent dissemination, or diffusion, "into the field". The NSDPHMS was designed to investigate the diffusion and adoption of school-based, self-applied fluoride mouthrinse or tablet programs (FMRP). Fluoride tablets are chewed and ingested and provide benefits topically to erupted teeth, but also to teeth still developing that have not fully erupted. Fluoride mouthrinses are not swallowed and only protect teeth that have erupted. The papers refer to these types of programs collectively as school-based, self-applied fluoride mouthrinse programs, therefore the acronym FMRP will be used inclusively for consistency.

The measures of interest included perceptions of the adopters and nonadopters about the intervention and the relative importance of these perceptions in terms of the decision to adopt. Superintendents were included as adopters if they were the individual who made the decision to initiate and did not simply inherit a program from a previous decider. Additional sub-analyses included; (1) what criteria were used when evaluating the preventive health innovation; (2) what

information or training was sought prior to deciding whether or not to adopt; (3) whom the decision-makers consulted for technical assistance; (4) and what roles other health and education professionals, as well as community members, played in the decision. For the purposes of this review, attention will focus on aspects of the study regarding the decision to adopt or to not adopt versus post-implementation issues including adoption accuracy and program discontinuation.

Phase I of the NSDPHMS began in March of 1979 when all 15,024 public school superintendents in the United States were mailed a seven-item survey instrument designed to explore whether or not the superintendent had heard of fluoride mouthrinse or tablet programs and to document the number and location of school-based fluoride programs. Additional data were collected to determine the fluoridation status of the communities served, their Standard Metropolitan Statistical Area (SMSA) status, the number of students enrolled, and the range of grades taught. Phase I had a 75% response rate with a slight difference between those districts that had an FMRP (median 72%) and those that did not (median 63%), and between urban (median 87.2%) and rural school districts (median 71.4%).

During October of 1979, Phase II of the study was initiated where a subsequent more comprehensive survey was mailed to sub-populations of superintendents created based on the responses to Phase I. Phase II was designed to explore characteristics of school districts that might differentiate adopters from non-adopters, and to further investigate the adoption process. The response rates for Phase II were 79.4% for the adopting superintendents (N = 238) and 70.7% for non-adopting superintendents (N = 345). There were no systematic differences in characteristics between respondents and non-respondents in Phase II of the study.

Overall, the survey revealed that 23% of the total were providing an FMRP at the time, which increased to 39.9% in those who had heard of an FMRP prior to the survey. The association between superintendents' perceptions about FMRP and whether they chose to adopt was significant (Chi-square, $p < 0.01$). When compared to non-adopters, adopters tended to report that funds were available (adopters 61.9%, non-adopters 23.1%), that the intervention was inexpensive (adopters 87.4%, non-adopters 50.5%) and that the FMRP was easy to implement (adopters 62.9%, non-adopters 26.9%).

Each group did agree that dental health was a priority and that the program was easy to understand. Adopting superintendents were most frequently first informed about FMRP by a school or

public health professional (68.7% vs. 37.5%) and in 83.2% of adopting districts school health personnel were identified as playing a role in influencing the superintendent to adopt the program. In adopting districts, local public health departments where described as influential by 56.9% of respondents and in one paper (Coombs et al., 1981) were categorized as "boundary spanners" who facilitate idea and information exchange across ostensible borders, both within and among organizations. In 67.0% of adopting districts principals were cited as being influential and were also identified as being crucial as the program occurred in settings they managed. Other influencers included school board members and parents (50.5%) (J. B. Silversin et al., 1980a).

Coombs et al. indicated that most administrators were not in search of a solution to the issue of tooth decay in their students, but rather were targeted by outside groups. Resistance to adoption was not indicated as a major issue by those who adopted FMRP, however a small number of non-adopters (15.0%) indicated that only one group, anti-fluoridationists, was seen as likely to exert a negative influence.

Maine Office of Dental Health Survey of Public-School Superintendents

In 1982 the Maine Department of Human Services (the state public health agency) sponsored a survey of public-school superintendents (N = 145) and private school principals (N = 63) modeled after the NSDPHMS to better understand the beliefs, knowledge and attitudes about FMRP in their state (Deatrick & Sorg, 1982). The goal was to use this information to facilitate more targeted efforts at increasing support for adoption of FMRP. The overall response rate was 60%. A large portion of respondents perceived a need (71.4%) by indicating that untreated dental decay was at least moderate problem. Only 4.2% believed it to be severe, slightly lower than in NSDPHMS, where 26.8% of respondents thought untreated caries was a problem (J. B. Silversin et al., 1980a).

A majority of superintendents (60%) felt that the school was at least a "moderately appropriate" setting for FMRP, however 21% felt that it was "not at all" the school's role to facilitate preventive dental programs. Three quarters of respondents believe that FMRP are effective at preventing caries and 8% believed they were not. The primary conclusion of this article was that Public

Health officials should take a lead role in influencing the beliefs, knowledge and attitudes about FMRP in school superintendents (Deatrick & Sorg, 1982).

NSDPHMS Follow Up Study

In consultation with the NSDPHMS study authors, Scheirer et al. extended their data collection by conducting telephone interviews using the same sampling frame of US school district superintendents employed by Coombs et al. and constructed a longitudinal record by reusing components of the 1979 NSDPHMS survey instrument (Scheirer, 1990; Scheirer et al., 1987). The total number of districts in the 1985 telephone survey sample was 1,072 districts with 528 districts designated from the 1979 results as adopters (76% response rate) and 544 districts designated nonadopters (70% response rate). Scheirer conducted a secondary interview (89% response rate), which investigated aspects of implementation accuracy and program discontinuation with the principal of one participating elementary school in each adopting district, but these results will not be explored.

No correlation was found between fluoridation status of water in the community and FMRP adoption, which mirrored the 1979 results (Coombs et al., 1980). The relationship between the proportion of children designated as low-income (based on participation in a federal poverty program) to the adoption of FMRP was almost linear, which the authors interpreted as the districts' perception of need based on poverty. Adoption of FMRP was not correlated with funding availability, although respondents frequently described funding as coming from other sources. Districts in suburban areas were slightly less likely to be adopters (48%) than districts in large cities (64%) or rural areas (62% adopters). In adopters, 73% of respondents indicated that the first source of information about the FMRP was from a health-related origin and the district was more likely to have adopted when a health-oriented individual was the first source of information about the FMRP, most often from state and local public health officials, as well as from school district health personnel (Scheirer et al., 1987).

In 1990, Scheirer wrote an additional article that reported on the same data from the NSDPHMS follow-up study but examined processes through which school districts made decisions about adoption and discontinuation of FMRP (Scheirer, 1990). Scheirer drew from three theoretical frameworks on the diffusion of innovation to select potential explanatory variables; classical, organizational structure and

political (Greer, 1977). The "classical" model emanates from Rogers' research on diffusion theory and focuses on the characteristics and perceptions of individual adopters. The "organizational structure" model examines differences in organizational characteristics and resources, including economic variables. The "political" model examined processes by which innovations enter organizations. Through multivariate logistic regression analyses, Scheirer found statistically significant results in both the classical and political perspectives, but none were found in the organizational perspective which included district type and size, geographic characteristics (urban, suburban, rural), prior experience with dental programs and financial capabilities.

There were four variables found to be statically significant from the so-called political perspective. First, when the initial source of information was a health-related individual, the district was more likely to adopt (ß .24, $p \leq .0$) which matched the prior survey results (73% of respondents) and was most often described as being state or local public health officials, or school health personnel. Second, the presence of a "champion" in the decision process (ß .31, $p \leq .0$) increased the likelihood of adoption. In 50% of the districts, the champion was also the first source of information. Third, groups or individuals opposed to the program negatively affected adoption (ß .14, $p \leq .0$), however, only 55 districts mentioned the presence of opposition and was commonly reported to be a teacher (22 districts) or parents (22 districts). Antifluoridationists were only mentioned by three districts. Fourth, the more individuals or groups whose approval for adoption was necessary increased the likelihood for adoption (ß .06, $p \leq .0$), which was interpreted by Scheirer as supportive of the value of an inclusive process.

There were three classical perspective variables significantly related to adoption. The strongest single predictor in the entire analysis was the "favorability index" which indicated the respondent's perception of characteristics of FMRP (ß .54 $p \leq .0$). Scheirer cautions interpreting causal effects of this attitudinal variable because it was collected after the adoption decision, but it does match results from the original survey. When evaluating characteristics of the decision-maker, only one variable was found to be significant. Superintendents with higher education level (generally a doctorate rather than a master's degree) were slightly more likely to adopt (ß .08, $p \leq .1$). The

perception of need by the decision-maker was positively related to adoption (β .004, $p \leq .0$), which indicated that the proportion of low-income children in their schools did influence the decision.

Discussion

These reviews revealed a significant gap in the literature with respect to research and analysis of determinants that influence adoption decisions of school-based dental sealant programs. However, influential determinants in the decision process for adopting a somewhat comparable preventive dental program in elementary schools 30 years ago (FMRP) were revealed. These determinants may apply to the current research question, and include the perception of need, attitudes and perceptions about the intervention, the role of influencers, including the value of a "champion" involved from introduction of the subject through the entire decision process, particularly one who is health oriented.

Throughout the references abstracted in this review, the perception of need influenced adoption decisions of FMRP, both based on the belief that dental health was a priority for students (Coombs et al., 1980, 1983, 1981; Deatrick & Sorg, 1982; J. B. Silversin et al., 1980a) and that untreated caries was a moderate (Deatrick & Sorg, 1982) to severe (J. B. Silversin et al., 1980a) problem in their schools. Superintendents' adoption decisions in one study was strongly associated with the proportion of low-income children in their schools (Scheirer, 1990).

Perceptions and attitudes regarding the intervention were significantly associated with a superintendents' adoption decision (J. B. Silversin et al., 1980a) and in one study the single strongest predictor was the respondent's perception of characteristics of the intervention (cost, understandability, difficulty), however the author cautions against interpreting causal effects of this attitudinal variable because the data were collected after the adoption decision (Scheirer, 1990) and could mask a systematic bias.

The presence of a health-oriented individual in the adoption decision process was found to positively affect the superintendent's decision to adopt (J. B. Silversin et al., 1980a) and in one study this individual was further described as a "champion" (Scheirer, 1990). Adopters were most frequently first informed about FMRP by a school or public health professional (Coombs et al., 1983; Scheirer et al., 1987) and were more likely to adopt when a public or school health oriented individual was the

first source of information (Coombs et al., 1983; Scheirer, 1990; Scheirer et al., 1987). Public health was also described as being a "boundary spanner" (Coombs et al., 1981) and that public health officials should take a lead role in influencing the adoption decision (Deatrick & Sorg, 1982). Other influencers included school board members, parents and principals. Principals were identified being "crucial" (Coombs et al., 1980; J. Silversin, Coombs, & Drollette, 1980) a stakeholder group to target (Coombs et al., 1983). Evidence of the effects of opposition was minimal and included anti-fluoridationists, (Coombs et al., 1983) teachers and parents (Scheirer, 1990).

Coombs et al. (1981) indicated that most administrators were not in search of a solution to the issue of tooth decay in their students, but rather were targeted by outside groups. Scheirer (1990) also posits that a health innovation may not be a priority to an innovative school administrator maneuvering through an adoption decision processes because the purpose of the intervention is not fundamental to the primary goals of the adopting educational organization. Scheirer further concludes that adoption decisions were affected primarily by influences emanating from effective interpersonal communications rather than through a structured, deliberate, decision-making process. These premises, combined with the evidence that perceptions about the intervention strongly influence adoption, underscore the necessity for strong interpersonal interactions from the point of introduction of the innovation, optimally through a champion, particularly one from a health-related field. This approach could influence adoption decision and the incongruous effort of introducing a non-educational innovation into an educational setting.

In general, the research conducted in this review of FMRP adoption was of high quality, in large part due to the fund source being NIH, and the rigor placed on the research methods. Based on assessment of threat to internal and external validity and overall risk of bias, the quality measures assessed for these studies ranged from medium (Deatrick & Sorg, 1982) to high (Coombs et al., 1980, 1983, 1981; Scheirer, 1990; Scheirer et al., 1987; J. B. Silversin et al., 1980a) on a scale of low, medium, high. Structured steps were taken, without the benefit of an additional reviewer, to ensure the reviews were conducted in a thorough manner however it is possible that articles relevant to the research question were not captured.

Limitations in this first literature review are inherent in that although the search was conducted with the assistance of librarians but the work of assessing and abstracting was completed by the author alone. Limitations of the review related to FMRP include the data being 20 and 30 years old and that although the intervention is a preventive dental procedure provided in a school setting, FMRP are fundamentally different from SBSP and the determinants described as influencing the adoption of FMRP may not be directly translatable to a SBSP adoption decision scenario. Both SBSP and FMRP are cost effective, clinically efficacious and delivered in schools, however the former requires professional staff, specialized equipment, dedicated space and consent process. It was possible for a school to self-initiate an FMRP but that is not the case with an SBSP, which for the reasons delineated above, requires an outside entity to conduct the services. Finally, even though their influence was low, there is no apparent analog to the opposition to FMRP from antifluoridation activists with SBSP.

In 2013, The Community Preventive Services Task Force stated that "school-based programs are complex interventions … [and] … future studies should clearly describe methods by which schools are recruited and programs are implemented (Community Preventive Services Task Force, 2013)." The truth of this statement is evident in the results of this review which will be helpful with informing this research on determinants that influence the decision to adoption SBSP.

CHAPTER 3: STUDY METHODS

This chapter describes the methodological approaches and analytical tools used to answer this study's research question; *what are the determinants that influence the decision of an elementary school principal in Georgia that predominantly serves low-income children to adopt a school-based dental sealant program?* Attention was focused on the principal's decision and decision process including various features of context that potentially influenced the decision and not on post-adoption decision components, including implementation.

Study Design

This study was divided into three separate Aims. For Aim 1 descriptive and quantitative data and other information about the characteristics of school-based dental programs were gathered from publicly available, web-based sources and through discussions with staff from several of the programs conducting the services. The results from this effort were intended to be descriptive in nature and can be found in Chapter 4. For Aims 2 and 3, in-depth, semi-structured, telephonic key informant interviews (KII) were conducted to collect data from elementary school principals in two Cohorts, the results from which can be found in Chapter 5. Cohort 1 was comprised of elementary schools that currently host an SBSP according to data provided by the Georgia Department of Public Health, Dental Health Program; Cohort 2 were elementary schools not currently hosting an SBSP.

The original intention was to interview 8 to 12 principals per Cohort (16 – 24 total), however after extensive recruitment efforts the final total for Cohort 1 was six. For Cohort 2, data saturation was reached at 12 total interviews at which time recruitment for interviews was discontinued. Data saturation is a component of qualitative collection that specifically relates to the degree to which new data and concepts are repetitive compared to what has been expressed in previous data, i.e. no new ideas are generated from the interview questions (Saunders et al., 2018). Pragmatic Qualitative Research approach focuses on decision makers within a real-world situation (Savin-Baden & Major,

2013) and was chosen as the method to analyze the interview text. The analytical design integrated a combination of deductive (conceptual framework) and inductive (data-driven) coding to the text as meaning was ascertained from the responses to the questionnaires (Bradley, Curry, & Devers, 2007).

IRB and Protection of Human Subjects

On August 8, 2019, the Office of Human Research Ethics, Institutional Review Board (IRB) at the University of North Carolina (UNC) Chapel Hill completed its review of this study (#17-2709) and determined it to be exempt from further review. The exempt status was based on the minimal risks to participate, however appropriate precautions were taken to prevent a breach in confidentiality and to protect the privacy of all study participants. After IRB approval, the interview guide was revised slightly with additional input from the committee prior to data collection (Appendix 4).

Participant Eligibility

The study population was public elementary school principals, as they were deemed to be the ostensible decision-maker in the adoption decision at the school level. To be eligible for the study, participants had to be currently employed as the principal at a public elementary school in Georgia that predominantly serve low income children. Participation rates in the Federal Free and Reduced-Price Meal Program (FRPM) are commonly used as a proxy for need (Siegal & Detty, 2010; Siegal, Farquhar, & Bouchard, 1997; Snyder & Musu-Gillette, 2015). The Georgia Department of Public Health Dental Program uses 50% FRPM participation as an eligibility criterion for their SBSP program to focus limited resourced on the highest need as low-income children are 20% less likely to have sealants (Centers for Disease Control and Prevention, 2016) compared to higher income children. Initially, to be eligible the school needed to demonstrate a minimum of 50% FRPM participation. However, due to significant recruitment issues this requirement was waived and ultimately two of the schools in Cohort 2 had lower than 50% participation. Additionally, it was discovered by the PI after the interview one school in Cohort 1 served less than 50% FRMP, which will be explained further in findings.

Subject Recruitment

For recruitment purposive sampling techniques were employed, which included snowball sampling, where participating principals were asked for referrals to other eligible principals at the end of each interview. Potential participants were invited to participate through an e-mail distributed from the Principal Investigator's UNC email address. The message explained the research study, including potential benefits and risks, and asked the recipient to participate in a telephone interview (Appendix 2). A follow up email was sent after 7 days and in the case of Cohort 1, a follow up phone call to the number listed on the school's website was made. Significant issues with recruitment were encountered in both Cohorts which is described in the follow sections.

Cohort 1

For the purposes of this study, a school-based sealant program is one that conforms to the Association of State and Territorial Dental Directors (ASTDD) definition, which states that school-based programs are conducted completely within the school setting with teams of dental health professionals such as dentists or dental hygienists utilizing portable equipment or in a fixed clinical facility within the school setting or in a mobile dental van parked on school property. Potential participants for Cohort 1 where identified through data provided by the Georgia Department of Public Health Dental Program, which currently funds and monitors SBSP across the state. Principals' names and contact information were located on the schools' public web sites.

The sampling frame was comprised of 35 schools that had hosted an SBSP in the 2018-2019 school year, however, six schools were removed as ineligible for the study as not meeting the ASTDD definition or not being an elementary school (1 middle school, 2 high schools, 3 non-SBSP partnerships). Additionally, the PI had been informed by the program that they used the 50% FRPM threshold as a selection criterion for hosting SBSP, however it was determined for one school only 39% of the students participated in FRPM, which will be described further in findings.

During the first week of October 2019, a total of 29 email invitations were distributed to Cohort 1, which resulted in only one principal agreeing to participate. One principal had recently left the school and the invitation was updated with the new principal's information. Seven days later a

follow up email was sent to non-responsive principals, which yielded one decline and no other affirmative replies. The following week phone calls were made to the phone number listed on the school's website which yielded no further agreements to participate. At this point, in consultation with dissertation committee co-chairs, the decision was made that the PI could attempt recruitment of principals by utilizing professional relationships with leaders in both the fields of public health and education. For Cohort 1, the primary intermediaries were local district public health directors (DHD) who had the superintendent of schools on the local board of health. The DHDs who agreed to assist were briefed on the project, provided copies of the recruitment email and independently acted to recruit principals on the PI's behalf. The final total of Cohort 1 principals that agreed to participate was six.

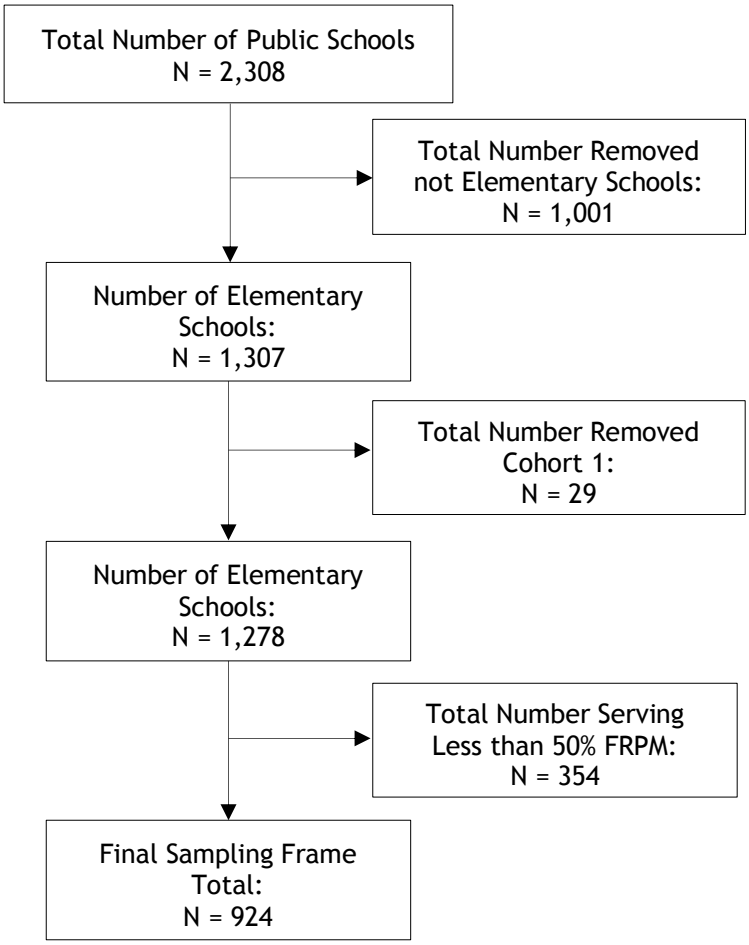
Cohort 2

Selection of principals in Cohort 2 from schools that had not hosted an SBSP was achieved through creation of a sampling frame using two publicly available data sources. An excel spreadsheet was downloaded from the National Center for Education Statistics which contained rich demographic and enrollment data about all public schools in Georgia (N = 2,308) for the most recently available academic year (2017-18). However, these data did not include the principal's name or email address. A downloadable database from the same academic year with contact information including email address was located through an internet search on the Georgia DOE website. The two data sets were merged using a common, unique identifier [State_School_ID]. The data were filtered to only include elementary schools which served greater than 50% FRMP and the 29 schools from Cohort 1 where removed, resulting in a final total of 924 eligible schools (Figure 4). Upon completion of the last step, no further edits or modifications were made to the sampling frame.

On October 27, 2019 the PI sent invitations to the first 75 eligible principals in the sampling frame for Cohort 2. By the end of the first seven-day period, the PI received 2 bounced messages and one decline. Given the experience with recruitment of principals in Cohort 1 and in consultation with committee co-chairs, the PI began to work through professional contacts in the fields of public health and education who were briefed on the project. These intermediaries were provided copies of the

recruitment email and acted independently to recruit principals on the PI's behalf. Due to the viral nature of how recruitment evolved for Cohort 2 it is impossible for the PI to know or describe the total

Figure 4: Sequence of Data Filters Applied to Cohort 2 Sampling Frame



volume of messages sent on behalf of the PI. In addition to email recruitment, also in consultation with dissertation committee co-chairs, on November 4th, 2019, the PI attended the annual meeting of the Georgia Association of Elementary School Principals to recruit participants which yielded one call back. The total number of interviews conducted for Cohort 2 was 12 and was concluded after saturation was reached.

Data Collection

Semi-structured key informant interviews were conducted during October and November 2019 with 18 elementary school principals in two Cohorts to identify and characterize the determinants that influence decisions to adopt school-based sealant programs. In some instances, a time was scheduled for the interview by agreement, in some instances a window of availability was provided to the PI via email and attempts were made to reach the principal. In several cases the principal contacted the PI directly and an interview was conducted at that time.

Participation was at no cost to the principal other than their time, nor did they receive any incentives to take part. At the start of the interview the principal investigator explained the purpose of the study and assured the participant their name and the name of their school would be confidential and that direct quotes used in the study report would not be attributed to an individual participant or their school. Though none were encountered, participants were invited to bring up questions or concerns prior to scheduling the interview or at the start of the interview. Participants were informed that they were free to take breaks or to terminate the interview at any time, and that exercising this option would have no adverse effects on their school. They were further informed that the interview was solely for the purposes of this doctoral dissertation. Verbal consent was obtained from all participants and all 18 agreed to be recorded.

Participants were asked to confirm basic information about their status as the principal including time in the role and length of their career in education. They were also asked to verify basic demographic data obtained from NCES about their school. During the interviews, the PI applied the technique of "member checking", also known as informant feedback or respondent validation (Creswell, 2014), whereby the PI repeated content and key quotes to participants to assess understanding and validity. There were two distinct interview guides, one for each Cohort. The questions were slightly modified to account for the presence or absence of an SBSP at the school. The differences were not substantive. The interview guides were designed to have core questions with sets of subsequent probes to be used depending upon how the participant answered the question and were intended to stimulate discussion on topic areas that related directly to the study aims. The interview questions were mapped to the study aims and aligned with characteristics described in the conceptual

framework (Table 2). The interview guide can be found in Appendix 4. Upon completion and acceptance of the dissertation, all research materials, including transcripts, recordings, and notes, will be destroyed as a privacy protection.

Data Analysis

During data collection all recordings were uploaded as they were completed to a third-party, web-based transcription service. Transcripts were downloaded, saved securely, and deidentified and a unique identifier was applied to the study materials. From October to December 2019, the principal investigator loaded each transcript into MaxQDA qualitative data analysis software solution. To minimize loss of recall, each transcript was read as soon as possible after the interview and a document level memo was written in MaxQDA to summarize ideas and concepts that emerged from the discussion. The memo also described the general tone and delineated additional interesting, unexpected or noteworthy information recorded in the discussion.

Starting with nine deductive codes from the conceptual framework, open coding was conducted on response level textual units (as opposed to word-by-word or line-by-line). This facilitated exploration of broader concepts and ideas provided by the respondents throughout the coding process and resulted in the identification of seven additional data-driven (inductive) codes. The coding process was iterative and applied to all 18 transcripts in three to four passes. As new data-driven codes were identified in the text, a memo was developed in MaxQDA for each code, the contents for which included a name, a description and text examples quoted verbatim to facilitate clarity and consistency. In some cases, conflicts and overlap with other codes were described in the memo to ensure clarity when application of the code to the text was appropriate for the second coder.

A second coder was engaged to validate the work completed by the PI and to vet the themes that emerged to reduce the possibility of bias and test interrater reliability. The second coder was an undergraduate student with prior qualitative coding experience. This individual had no connection to the PI, no academic background in public health or dentistry and was not compensated for his efforts. Once the PI completed coding all 18 interviews, the MaxQDA project file was duplicated, deidentified and all codes applied to the transcripts by the PI were deleted. This version of the project file was

renamed and shared with the second coder. A consultation was scheduled where the PI reviewed the project file and each code memo in depth, after which the second coder coded a transcript selected at random. This file was provided to the PI and was reviewed in detail. It was compared to the primary coding for the selected transcript and comments were written for each area of alignment and misalignment. A follow up consultation was scheduled during which each code-level comment was reviewed with the second coder. The next step was second coding six additional transcripts (three from each Cohort) with another consultation. A third round of second coding completed all 18 transcripts. Through this process, an intercoder reliability of 80.0 percent was achieved, in line with the 80 percent agreement threshold that is recommended as a benchmark for qualitative research.

In the next phase of analysis, codes were assessed and grouped into themes that emerged from the data (DeCuir-Gunby, Marshall, & McCulloch, 2011). This step was also iterative, and versions of theme structures evolved into a final set of three overarching themes and are described in Chapter 6. The theme set was vetted with the second coder to confirm unbiased conclusions were drawn.

CHAPTER 4: OTHER SCHOOL BASED DENTAL SERVICES

Aim 1 of this research project was to collect information regarding non-SBSP dental health programs and interventions occurring in public elementary schools. Data collection methods as described in Chapter 3 were informal, referral-based conversations with knowledgeable individuals who worked in the programs and from publicly available sources, mainly websites. In some cases, the information was second-hand due to nonresponses from an optimal informant. The findings are presented in descriptive terms and are not intended to be quantitative in nature.

In the study proposal, it was suggested that the output of this effort could help inform a strategy to recruit principals for Cohort 2, however the purposive sampling approach chosen to recruit participants rendered this unnecessary. The intent of Aim 1 was also to discover to the degree possible what other types of in-school dental programs are active in Georgia's elementary schools. The existence of other programs in the same settings could either coexist with, augment or potentially compete with expansion of SBSP, which will be applicable to the plan for change.

Performance Standards for Health

Public elementary schools in Georgia are required to comply with health education standards which contain minimal references to dental health (Georgia Department of Education, 2009). Several principals during their interviews for Aims 2 and 3 described these standards as being the impetus for hosting dental education in the school. Kindergarten health education standard HEK.6 requires that a student will be able to demonstrate the ability to use goal-setting skills to enhance their health, one example is for kindergarteners to set a goal to "brush their teeth three times a day, every day". The Chief School Health Nurse for a major metropolitan school system in Georgia that serves over 44,000 children in 64 elementary schools indicated that their system attempts to conduct at a minimum one educational event per elementary school per year to comply with the standards. This would include instruction on proper tooth brushing and in some years, they provided toothbrushes when resources

permitted. However, this source did describe dental health as genuine priority for the school system and had an awareness of the negative impacts for poor oral health on attendance and academic performance.

This source also described the existence of several school level partnerships in the jurisdiction with local Federally Qualified Health Centers (FQHC) and private dental clinics, but further stated that all partnerships require a Memorandum of Understanding (MOU) at the district level. This legal procedure takes independent decision-making authority away from the principal, which was an issue that emerged from the interviews with school principals and will be described further.

Dental Screening Laws

According to the Children's Dental Health Project (CDHP), there are 14 states and the District of Columbia that have Dental Screening Laws. By design, DSLs are intended to ensure that children in need are connected with a dental home such that oral health does not impede their ability to learn. Georgia is one of the states with a DSL, which dates to the early 1990s. All kindergarten and new first grade students, all students new to Georgia and any child transferring from a private school are required by Georgia Law 20-2-770 to have a Certificate of Vision, Hearing, Dental and Nutritional Screening (Form 3300) completed no more than 12 months prior to the day of enrollment. A "3300 Form" can be obtained and completed at a local public health department or a physician office. Unfortunately, the law establishes no requirement for follow-up and there is no direct connection to resources for follow up. A complicating matter is that the law creating the requirement in Georgia for the screening prior to enrollment exists in the education title but gives the department of public health the responsibility only for creating the form and making the form available; there is no systematic use of the Form 3300 dental screening data in Georgia and there is no enforcement for non-compliance.

In terms of a plan for change, the presence of a DSL in Georgia is a positive and represents an opportunity for both robust statewide surveillance for dental issues as well as a mechanism for referral to care. According to the Dental Health Project, to be most effective, DSLs should have appropriate supportive structures in place, including that data be accessible and managed appropriately and that there be effective referral mechanisms for children to dental homes. Additionally, CDHP described the

need to assure the presence of active dental sealant programs, particularly school-based health programs (Children's Dental Health Project, 2019). Efforts such as these require resources to upgrade the reporting systems to support the workforce capacity needed to assure the DSL is effective. According to the GADPH Chief School Health Nurse, there have been discussions about having the Form 3300 data uploaded into a statewide platform to be used more effectively but to date nothing has been funded or planned and the system does not currently exist.

Tele-dentistry

One public health district in Georgia has operated a tele-dentistry program since 2008, after being awarded a HRSA grant to fund a pilot project with a local head start program. Currently, the tele-dentistry program targets three counties in the health district, where according to the District Health Director (DHD), there are either no dentists in the county or access to dental care is very limited. There is one elementary school program per county and the district has an MOU with each school. In the central county, there is a dentist under contract with the health district who participates in the screening event. This dentist refers to local dentists who are also under contract with the health district. These dentists are all remunerated by the health department which in turn recovers some cost by billing insurance, predominantly the Medicaid program.

At the beginning of the school year a consent form is sent home for parents to agree to their child to be screened through tele-dentistry. On the tele-dentistry event day, the children whose parents consented to participate are seen based on a stratification by acuteness of complaint determined by program staff. They are screened, treated or referred for treatment. Sealants as a service were added recently and are provided in some cases during the event; however, this program does not meet the definition of a school-based sealant program. In the 2018 - 2019 school year there were 59 clinic days, during which 372 children were seen; 297 of whom were referred to a dentist for treatment, which demonstrates a clear need for preventive dental care. No show rates where described as being "very

high" for follow up appointments with treating dentists, however the district does not have the capability at this time of collecting data on this aspect of the program and could not provide actual data.

According to the DHD, when the tele-dentistry program began to expand after the pilot, they encountered opposition from local dentists who expressed a concern for preserving the child's dental home. The argument was made in the discussions with local private providers that these children are not typically being seen by a dentist and are therefore are not being taken away from a dentist currently treating the child. The health district's stated goal was never intended to take patients away from local dentists, but to "help fill the gap", to promote the dental home and to eventually not need a tele-dentistry program. When coupled with an on-site dental hygienist who practices under general supervision rules, this technology eliminates the requirement for travel and maximizes the engagement time with a dentist.

Private Mobile Dental Clinic

There is one private dental provider in Georgia that operates a mobile clinic and targets needy schools for dental services. Their business model is to target schools designated as Title 1 and to focus on children who have health insurance, predominantly Medicaid. According to the administrator interviewed for this study, they will serve children who do not have insurance if requested at the time of the event. Medicaid claim data from 2014 – 2018 indicate that this provider was active at elementary schools in all 159 counties in Georgia, during that same time frame.

Two principals recruited in Cohort 2 mentioned their partnership with this provider specifically and in very positive terms, elements of which apply to future successful expansion of SBSP. Namely, this provider is focused on ensuring that the experience at the school level is as seamless as possible for participating school. Unfortunately, this provider has also described in a negative light by local dentists for billing the maximum of a child's Medicaid benefits at the school-based event, in some cases leaving children in need of follow-up care for which the child has no coverage. One DHD also described opposition to this provider from local dentist due to "billing competition." Between 2014 and 2018 only 0.7% of the for-profit provider's total Medicaid claims (N = 2,784 of 417,202 total claims) were for sealants (D1351 - Dental sealant per tooth) performed on only 2.3% of the children they

served (N = 1,610 out 70,101 children served) (author's analysis). This provider is focused on providing billable services to individuals on Medicaid versus a preventive population-based delivery approach based on need.

School Based Health Centers

According to the Georgia School-Based Health Alliance, Inc. (GASBHA), school-based health centers (SBHCs) are a model of healthcare delivery that increase access to healthcare and improve the overall health of the neediest children and adolescents. The literature supports the role of SBHCs in increasing access to healthcare, improving health outcomes, reducing health disparities and reducing medical costs. School Based-Health Centers can significantly improve academic achievement as well as reduce absenteeism rates (Soleimanpour, Geierstanger, & Alliance, 2014). SBHCs are located in schools or on school grounds and provide a wide range of health services to children at no or low cost, and in some cases serve students' dental health needs. Starting in 1994 with a university-based grant from the Health Resources and Services Administration (HRSA) to open a comprehensive school-based health center at an elementary school in southeast Atlanta, sites have expanded to a present-day total of 32 comprehensive SBHCs in Georgia. As of this writing, five of these clinics provided dental care, which can and likely include preventive care such as sealants, cleanings and fluoride treatments.

In discussions with three of the five clinic operators, it was clear that the approach to dental care was a treatment model similar to a private dental clinic. Preventive measures including dental screenings and sealant application do occur, however, the target is typically an individual child with a complaint versus being a comprehensive population-based prevention program, like an SBSP. One discussion was with the Executive Director of a local Federally Qualified Health Center (FQHC) that has 41 clinics in 26 rural counties. They managed to implement four SBHCs, only one of which provided dental services and that was until recently. As of our discussion the dental services were very recently discontinued in that SBHC due to decision by the school board because of complaints from a local dentist about competition for patients. As a result of this decision, this executive director purchased a mobile dental van and was in the process of hiring a dental hygienist and dental assistant to serve

schools that desired to partner with his FQHC. The goal was to continue the same treatment model, which is a traditional dental office in a mobile format and not an SBSP.

Other Public Health Activities

Three of 18 public health districts in Georgia conduct some school dental health activities other than SBSP in elementary schools. These activities are very resource limited and typically exist with minimal local and State funds that cover the salary for a dental hygienist, their travel and some supplies, mainly toothbrushes. One public health hygienist in south-central Georgia has a goal to host a "toothbrush day" in each of 33 elementary schools in her 10-county district, where she attempts to provide each child with a toothbrush. According to NCES data these school served 22,881 students in the 2017-2018 school year and all but two of the 33 schools served greater than 50% FRPM. At its peak several years ago, over 20,000 toothbrushes were provided per year but funding shortfalls have reduced funding for supplies.

Another public health district also serves 10 counties which encompasses almost 100 schools, mainly elementary schools, but middle and high schools are targeted as well. The stated threshold is 75% FRPM to extend limited resources. This hygienist works with schools to assist with completion of Form 3300 and commented about the ongoing need for training personnel that are authorized to complete the dental portion of the form. Untrained medical professionals including pediatricians are not as proficient as hygienists at screening teeth for caries. Screening services are also provided and target schools that are at. This district's program is entirely funded by the state including salary, travel and supplies.

The public health hygienists interviewed for this information the term "bombed out mouth" to describe a state of poor dental health in children where tooth decay was rampant and, in many cases, irreversible. These elementary school aged children were in some cases receiving their first toothbrush and had possibly never seen a dentist. Reasons for such poor dental health in their experience included, level of parent's education on the need for hygiene, not being able to afford basic dental care, tooth brushing not being a priority and food access and quality of food related to poverty, and in some cases ambivalence about the situation.

School-based and School-linked Sealant Programs in Georgia

Since the mid-1980s local public health agencies in Georgia have received funds from the Georgia Oral Health Program for the operation of dental sealant programs, both school-based and school-linked. These programs target schools where at least 50% of the students are eligible for the Federal Free-and-Reduced Price Meal Program. In Georgia, 947 out of 1,307 (72%) public elementary schools fall into this range of FRPM participation. Over time, funding has come from a mixture of sources, including state appropriations, local county budgets, Maternal and Child Health Block Grant (Title V) and Centers for Disease Control and Prevention grants.

The sealant teams consist of a dentist, dental hygienist or dental assistant. Working under general supervision, the lead local hygienist schedules clinic days, transports and sets up equipment, places sealants, and manages submission of paperwork. All 2nd graders whose parents have consented to participate receive a screening, fluoride varnish and have sealants placed when appropriate. A referral is made when appropriate for treatment and other dental needs. For smaller schools, additional grades are included from first to fifth.

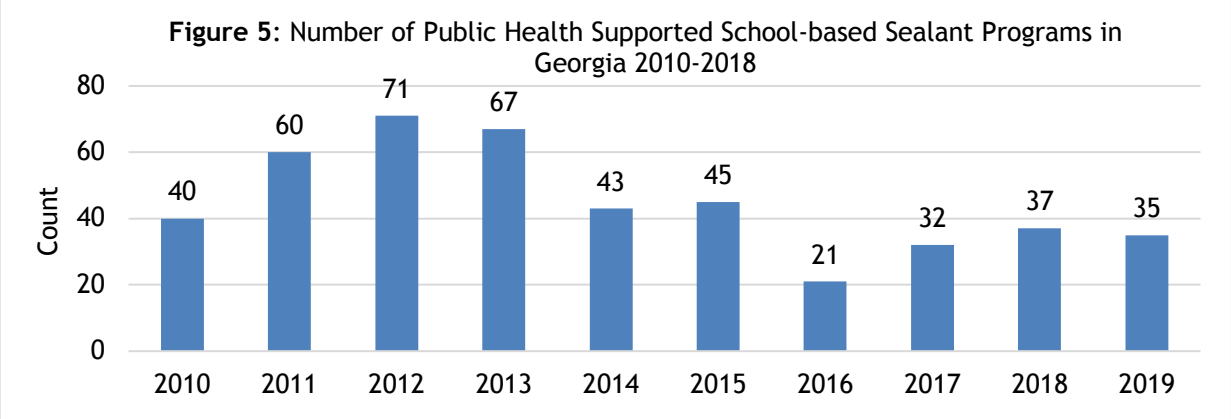


Figure 5: Number of Public Health Supported School-based Sealant Programs in Georgia 2010-2018

During the 2009-2010 school year, 45 schools participated and provided 2,616 screenings and 3,297 sealants to students. The number of sites expanded to 71 schools by the 2011-12 school year and provided a high of 5,337 screenings and 7,461 sealants in that year. By the 2012-13 fiscal year state budgetary constraints ceased the expansion into additional schools and by 2014 the number of sites in Georgia shrank to approximately 50 SBSPs operating in nine districts. By 2019, there were only 35 participating schools in seven out of 18 public health districts.

Other In-School Dental Activities

Through the process of learning about other in-school dental health activities as described above, there were other programs that were mentioned but information about these programs was not attainable, mainly due to lack of response to inquiries and limited publicly available information. Several individuals (and key informants) described partnerships with technical college's schools of dental hygiene, where hygiene students would attend the school to conduct education. It is not likely that clinical interventions were being provided and these partnerships were mentioned in association with only two elementary schools. At least one Medicaid Managed Care Organization has a mobile unit that partners with elementary schools, but the unit is not specifically designated for dental services and services are apparently limited to screening. Finally, anecdotally there are situations where local private dentists have partnered with an elementary school to provide education on oral hygiene.

CHAPTER 5: KEY INFORMANT INTERVIEW FINDINGS

This section includes findings from 18 key informant interviews conducted from October through November 2019. Every participant was a principal currently employed at a public elementary school in Georgia. Twenty-nine schools were contacted for Cohort 1, two principals declined, 21 did not commit or were non-responsive and six consented to participate. It is not possible to know exactly how many schools were eventually contacted for Cohort 2 due to the use of intermediaries, however once the decision was made to remove the eligibility criterion of greater than 50 percent FRPM participation there was a final total of 1,278 eligible schools in the sampling frame (Figure 4). Twelve principals agreed to participate in Cohort 2 before data saturation was reached and recruitment ceased.

Principal Characteristics

In general, the professional characteristics of the principals were notably different between the two cohorts. Overall, the tenure of the participants as principals ranged from less than one year to a maximum of 21 years, with an average 5 years, however several principals had served in the role at other schools prior to their current school. Participants overall had served an average of 21 years as educators including their time as a principal, which ranged from 10 – 33 years. However, principals at schools with sealant programs were on average in their roles as principals three times longer than principals in Cohort 2 and had been on average in education nearly one and a half times longer (Table 3).

Table 3: Tenure and Career Characteristics in Years of Participants by Cohort

Measure	All Participants		Cohort 1		Cohort 2	
	Tenure	Career	Tenure	Career	Tenure	Career
Mean	5	21	9	26	3	19
Minimum	1	10	2	11	1	10
Maximum	21	33	21	33	5	27

An intention of this study was to test the relationship between educational level and likelihood of adoption, which was also a finding by the authors of the NSDPHMS study described in the literature review (**education level**). It was discovered during the course of interviewing the respondents for this study that an education specialist degree (EdS) is a minimum requirement in Georgia to become a principal. An education specialist degree is an advanced practitioner course that goes beyond the master's degree. The next level after and EdS is a doctoral degree in education (EdD). All participants had either an EdS or EdD and there were no differences in the distribution of the two different degree levels between the two cohorts. There was a total of 12 who had earned a specialist degree and six who had completed an EdD and one EdS holder was currently completing a doctoral degree (Table 4).

Table 4: Educational Attainment and Career Characteristics of Principals by Cohort

Cohort	Degree	N	Average of Tenure (years)	Average of Career (years)
1	EdD	2	15.0	32.0
	EdS	4	5.3	22.5
	All Cohort 1	6	8.5	25.7
2	EdD	4	2.8	19.3
	EdS	8	2.8	18.1
	All Cohort 2	12	2.8	18.5
	Total	18	4.7	20.9

School Characteristics

The student population totals were somewhat higher in Cohort 1 compared to Cohort 2, likely due to one particularly large elementary school in Cohort 1 located in a medium sized town. This school was the only elementary school in the school district. The average number of students for the six schools in Cohort 1 was 817, with a range of 401 to 1,635. The average for Cohort 1 without including the large school was 652, much closer to Cohort 2 for which the average was 476, with a range of 268 to 978. The average number of students per school for both cohorts combined was 590.

The proportion of FRPM participants ranged from 39 percent to 87 percent in Cohort 1 which was 72 percent FRPM participation for all schools in the cohort (N = 6). For one school that had hosted an SBSP, it was determined after the interview that the school was below the 50 percent threshold, at

39 percent. In a follow up discussion with the GPHDP it was explained that the principal was individually motivated given their understanding of need in their school (**perceived need**) to take advantage of the opportunity to host an SBSP after becoming aware of the program through their district school nurse who had recently attended a conference where the GPHDP had presented (**targeting**) on the topic. While the proportion of students eligible for the FRPM program in that school was below the 50% threshold, there were 391 children participating in FRPM out of 992 total students. For Cohort 2, the range of the proportion of students participating in FRPM was broader due to the elimination of the 50% FRPM participation threshold during recruitment, with two schools falling below the lower limit. FRPM participation proportions ranged from 14 percent to 94 percent which yielded 74 percent for all of Cohort 2 (N = 12). The two schools below 50 percent had a combined total of 137 children participating in FRPM.

No attempts were made to assure geographic distribution of schools due to purposive and snowball sampling methods, however there was some dispersion achieved by chance in the locations of the schools that agreed to participate (Appendix 5). Additionally, the NCES data used to create the sampling frame included information about population levels using the NCES Urban Centric Locale variable (Appendix 6). These data indicate that towns and rural areas where more heavily represented in Cohort 1. Cohort 2 predominantly represented mid and small size cities, which is likely an artifact of sampling due to the influence of recruiting intermediaries. There were no schools represented in either tail of Urban Centric Locales designation in either cohort which were large cities and distant or remote rural areas. Due to the effects of purposive recruitment in one school district, six elementary schools out of 33 from one county school system participated in Cohort 2.

The distribution of sex was nearly identical for each cohort and followed a pattern found in all elementary students in Georgia of just slightly higher for males (51 – 52 percent) than females (47 – 48 percent). Cohort 1 was predominantly white (46 percent) and Cohort 2 was predominantly Black (53 percent). Each cohort had small numbers of 'Other' race (1 – 2 percent) but had generally similar distributions. The distribution of Hispanic ethnicity was slightly more divergent at only 1.3 percent for Cohort 1 versus 18.2 percent for Cohort 2 (Table 5). This is potentially related to geographic clustering in that cohort.

For schools in Cohort 1, five had been hosting an SBSP since at least 2015, the earliest year for which program data were made available (Table 6). One school started in the 2019 school year, for which data were not yet available. In that timeframe, 4,523 sealants were placed on 1,797 children in those schools. Five out of six of the principals in Cohort 1 had inherited the program. One of the principals had been an assistant principal at a school in the same school district that had hosted SBSP in

Table 5: Distribution of Select Descriptive Characteristics of the Student Populations for Each Cohort

Cohort	N	Students	White		Black		Other		Hispanic	
		N	N	%	N	%	N	%	N	%
1	6	4,899	2,259	46%	1,726	35%	42	1%	637	1.3%
2	12	5,717	1,337	23%	3,022	53%	94	2%	1,039	18.2%
Total	18	10,616	3,596	34%	4,748	45%	136	1%	1,676	16%

the past and retained the program when they became the principal at their current school. The remaining participant learned about SBSP through their district nurse who had recently attended a

Table 6: Numbers of Children Served and Sealants Placed in Schools that Hosted an SBSP Between 2015-2018

School	2015		2016		2017		2018		Totals	
	Pts	Sealants	Pts	Sealants	Pts	Sealants	Pts	Sealants	Pts	Sealants
A	135	401	87	251	71	220	144	445	437	1,317
B	89	275	104	322	184	61	35	113	412	771
C	94	276	103	285	173	62	81	238	451	861
D	105	293	85	253	60	186	80	312	330	1,044
E	48	148	64	209	34	110	21	63	119	382
Totals	423	1,245	443	1,320	522	639	361	1,171	1,797	4,523

- Data from the Public Health Dental Program were from the years 2015 – 2018.
- Totals may include students receiving services in multiple years however the likelihood is low and will not substantively skew the totals (GPHDP).

professional conference at which public health was present promoting SBSP and requested to host a sealant program. The influence of this relationship and its relevance to decision making processes will be explored in greater depth in Chapter 6. Moreover, this was the one school in Cohort 1 that served less than 50% FRPM.

Results from Interviews

Interview questions were semi-structured and included follow up probes to facilitate discussion, as needed. The findings from the key informant interviews are presented using a set of descriptive terms to summarize the qualitative results ordinally as follows: *limited*, *occasionally*, *some*, *many*, and *most* or *generally*. Additionally, this section approximately follows the structure of the interview guide. Where appropriate, the findings will reference any alignment or misalignment with the determinants (deductive codes) theorized in the conceptual framework (Figure 4). The interview guide was designed to primarily inquire about adoption decision characteristics related to SBSP. It was anticipated that some participants would have to be probed using sealant programs as hypothetical context based on their level of awareness of SBSP. Only two of 18 participants had empirical experience with the adoption decision of the SBSP at their school, therefore most questioning proceeded using SBSP as a hypothetical backdrop for the questions.

Principals in both cohorts were asked to describe the **initial factors** they considered when making a decision to adopt a new program, such as an SBSP. This question was designed to collect the leading response provided, known as primacy. Most principals expressed an initial concern regarding the value or overall benefit to the children in their school, moreover this was predominantly expressed by Cohort 2. The next most common response, which was spread nearly equally between the cohorts regarded impacts to the school day, such as time away from instruction (**competing priorities**). Limited responses across the cohorts were focused on characteristics of the program offered and the offerer which included being reputable, low cost (**complexity**) and minimizing the burden of effort to the school (**risk reduction**). Interestingly, for one principal in Cohort 1 their initial concern was for prior approval by the school board, a component of decision processes that will be expounded upon in Chapter 6.

When asked to further describe how they weigh or evaluate the **benefit** to their children, most expressed a need for assurance that the program would positively affect the student's overall well-being including long-term impacts over the students' lives. This answer was evenly distributed between the two cohorts. This is in slight contrast to the next most common response provided exclusively by Cohort 1, which expressed concerns about more immediate health needs of the student.

This was followed by concerns about potential impacts on (or interference with) academic outcomes from principals in Cohort 2 only. Generally, principals in both cohorts expressed a desire for a broader value to the child than specifically academic performance, both in the more proximate term as well as over the child's lifetime.

Each cohort was asked to either confirm that they had an SBSP (Cohort 1) or that they did not have an SBSP (Cohort 2). Each principal in Cohort 1 confirmed the presence of the program, however the five principals who inherited the SBSP did not know how long the program had been present in their school. All 12 principals in Cohort 2 confirmed they did not have an SBSP. On follow up questioning none had ever been offered to host an SBSP at their school or any other school where they may have been a principal previously (**targeting**). Furthermore, while some were familiar with dental sealants mainly through personal experiences with their own children, none knew what an SBSP was (**awareness)**. It was clear in the responses that Cohort 1 had SBSP due to a direct relationship with the public health entity offering and maintaining the program and that none of the schools in Cohort 2 had had the same experience.

Both cohorts were asked to describe any **other dental** health related services or programs being conducted in their schools. The most common response was "none" for both cohorts. This equated to 1,091 elementary school children in Cohort 2 who did not have even minimal exposure to dental health content while at school, 782 of whom were FRPM participants (71.7%). Many principals described having some form of dental educational program, typically on an annual basis, where a partner came into the school to teach and promote dental hygiene. Partners were generally public health hygienists, local dentists, or in one case a Medicaid Care Management Organization (CMO) that operated a mobile van. Two schools in Cohort 2 had arrangements with the same private, for-profit mobile dental provider and each expressed satisfaction with the relationship, mainly due to the minimal impact to school operations (**risk reduction**). One school had a formal partnership with a local Federally Qualified Health Center (FQHC) that conducted dental screenings, but the respondent was not able articulate details about how the referral process for follow up worked. Lastly, one school in Cohort 2 had a school-linked sealant partnership with local technical college school of dental hygiene.

This school also had permanent primary care clinic in the school and articulated plans to expand into dental services for the students in the future.

Table 7: Other Dental Health Services in Participating Schools

Other Dental Programs	Cohort		Total
	1	2	
School-linked Sealant Program		1	1
Partnership – FQHC		1	1
Partnership – CMO	1		1
Partnership - One day screen and referral event		1	1
Private Mobile Dental Care		2	2
Education	1	4	5
None	3	3	6
Total	5	12	17

Principals were asked a series of questions about factors that **influence** adoption decisions. When asked if there were **data** or specific types of **information** that they preferred to have to assist with facilitating a decision to adopt a program, most preferred to receive program effectiveness data, followed secondly by outcome data. A limited number of principals were primarily focused on ensuring the organizations were reputable (a common source for this information was other principals) and a limited number were not concerned about receiving specific data or information. Finally, one principal only needed enough data to ensure that they could make the convincing appeal to their district office; a reference to decision processes that exists at both the school and district level and is discussed in Chapter 6.

When asked if there were **individuals** or **entities** who potentially influenced decisions to adopt or sustain programs, specifically health programs, principals' answers included up to four responses in four general categories; colleagues (N=4), district personnel (N=5), partners (N=6) and school personnel (N=17). Two principals, one in each cohort, could not describe anyone or any entity that they would involve or would become inserted in the process, even upon probing. In these two cases, each principal functioned in a locality that imparted a fair amount of autonomy regarding decision making. This is relevant to understanding where the authority rests in making the decision to adopt and will be discussed in more detail in Chapter 6.

For some principals, the input of another principal was of value, but there was no discernable pattern between the cohorts or association with their tenures or experience levels. For some principals, ensuring that district personnel were consulted was important, which included both health and administrative staff. The stated motives to include staff at the district level included permission to proceed; in two cases a stated directive to so would be needed. Finally, one principal raised the issue of ensuring that risk management was consulted and that the entity offering the program had proper liability coverage.

Many respondents described engagement with other partners, not specifically educational professionals, which were primarily parents and public health. In some cases, it was proactive consultation through a semi-defined process, for instance with the Parent Teachers Association. However, some respondents gave the impression this engagement step to share information prior to proceeding with a final decision was for political expedience as opposed to true engagement in a deliberative process. The groups principals were most likely to engage with were their own school staff, which included counselors, secretaries, assistant principals, teachers and school health personnel. In limited examples the principal expressed the existence of a leadership team as a standard forum for decision making. Nearly half of the individuals mentioned by respondents in both cohorts where health professionals, similar to what was described in the literature review, where the presence of a health-oriented individual in the adoption decision process was found to positively affect the Superintendent's decision to adopt a Fluoride Mouth Rinse Program (J. B. Silversin et al., 1980a).

When asked to articulate any **concerns** they may have had about adopting SBSP in their schools, most principals in both cohorts had none. Some were concerned with issues related to cost, including any cost to families and space constraints in the school (**complexity**). Some principals were concerned about the quality of the program, primarily with how it is managed and the impacts this would potentially have on the school (**risk reduction**). Two principals, one in each cohort, expressed a strong concern for having enough slots on the day of the event to meet the demand.

Participants were asked if anything would or did **get in the way** of making a decision to adopt an SBSP during the decision process. Overwhelmingly, principals in both cohorts stated that nothing would get in the way (**resistance**) and was the only answer provided by participants in Cohort 1. A

limited number in Cohort 2 mentioned the need to have support from the district and similar number in Cohort 2 mentioned parents as a possible barrier, however in both cases, they gave the impression that these two groups where participants in a decision process rather than entities that would truly resist adoption, as antifluoridationsists were with FMRP.

When asked to express their thoughts hypothetically about why in Georgia **some schools do and other schools do not** adopt SBSP, the answers were varied, but most described either an actual lack of need based on the demographics in the community or a perception of a lack of need (**perceived need**). Most principals in Cohort 2 responded that principals simply do not know of the option or existence of SPBS (**awareness**). Other answers expressed in limited numbers across both cohorts included that it was not a priority for them (**competing priorities**), that there was a lack of leadership, or that they just did not know why a school would not adopt an SBSP.

Study Limitations

This research study followed a protocol which was approved by the UNC IRB and exempted from further review. Adjustments were needed with the recruitment approach in order achieve an adequate sample size. The final sample was a small subset of the total universe of all potential participants and the information collected may not accurately reflect the views of the universe of principals in Georgia. By design, the participants were not selected from a random sample and the results therefore are not generalizable to the broader population of principals. Regardless, the purposive sampling technique resulted in the collection of rich information from those principals who consented to participate. Principals were chosen as the target population because they were the ostensible decision maker based on guidance from colleagues in the Georgia Department of Education during development of the study methods. However, it was learned through many of the interviews that this is not always the case depending upon local policy. Therefore, the views of other decision makers, such as Superintendents or school board members have not been captured.

This study included principals in two groups, those that have had experience with SBSP (Cohort 1) and those that had not (Cohort 2). There were recruitment issues that affected both cohorts and ultimately resulted in fewer than the planned minimum in Cohort 1. Very few principals actually

declined, the predominant result was a complete lack of response to the invitations. It is possible if more principals in Cohort 1 were interviewed additional inductive determinants could have been collected or refinement of the results that were gathered could have been achieved. Data saturation was reached at 12 participants in Cohort 2 and the final total of 18 participants met the lower limit set in the study protocol criteria. Intensive efforts through the use of proxies were employed, which could have created bias in the results due to influence, however all 18 principals consented to be interviewed and were enthusiastic participants.

During the development of the interview guide, it was anticipated that some participants would potentially have to be probed with follow up questions based on a lack of awareness of SBSPs. Probes were designed to use an SBSP as hypothetical context for questions about their decision processes. Only one of 18 participants had empirical experience with the adoption of the SBSP at their school. As a result, most questioning proceeded using SBSP as the hypothetical adoption decision as planned.

Three schools in the final 18 served lower than the original proposed minimum of 50% FRPM participation set in the study protocol. This minimum threshold was waived to maximize recruitment as previously described. One of the principals at these three schools, perceiving a need for dental health interventions at their school, achieved agreement from public health to host a program after becoming aware of SBSP through their school district nurse. One of the schools in Cohort 2 was a magnet school for advanced academics, the other was designated in the NCES data as a 'regular' elementary school, but each of those schools had children participating in the FRPM program (N = 137) and were able to contribute a different perspective which did not yield divergent answers regarding adoption decisions. There was a degree of geographic clustering due to purposive and snowball sampling. This potential outcome was contemplated during study design and deemed to not be an issue with regard to the analysis however, there could be some limitations in the data related to urban versus rural perspectives.

CHAPTER 6: KEY THEMES AND DISCUSSION

Textual data recorded from key informant interviews were analyzed through an iterative, qualitative coding exercise (Bradley, Curry, & Devers, 2007), resulting in a final total of 15 codes (Appendix 7). Nine of the codes were postulated in the conceptual framework (deductive) and the remaining six were data-driven (inductive). Subsequently, meaning was derived using the codes from the questionnaires through an iterative, qualitative analytical process which resulted in three over-arching themes that emerged from the data. What follows are in-depth descriptions of the themes and, where relevant, the codes that composed the themes.

Theme 1: Whole Child

Principals were fundamentally attuned to the non-educational needs of their students and were broadly concerned with addressing more than just their student's educational attainment.

In the course of interviewing participants across both cohorts it was evident that principals had a broad awareness of the circumstances of their students, including the poverty levels in their schools as well as the attendant health needs of their students (**perceived need**). Principals were generally very knowledgeable about the negative effects of poor oral health on school attendance and academic performance. Many expressed a sense of responsibility that transcended pure academics to address perceived needs within the school setting. In several cases, principals invoked the actual term "whole-child" to describe a perspective regarding their self-imposed charge (**whole child**). This perspective was also a motivating factor with many principals who had proactively sought healthcare partnerships, including dental services, which were present in schools at the time of the interview. Further, in many cases, motivations extended beyond the direct benefit to the child, onto the family, the broader community, and to the future success of the child. Principals took the obstacles parents faced (**barriers, access to care**) with accessing care for their children into consideration when evaluating options to host health programming in their schools.

In regard to the relationship between poverty and health needs, one principal stated flatly:

> I think that there are more health needs in poverty environments.

Another principal demonstrated an understanding of health and poverty in the community context more broadly:

> And in particular in our community, in our public school, you know the demographics, you've seen those, you see the socioeconomic status. And then many times there's a correlation between that and a level of health and wellness.

The quotes below from participants across both cohorts generally indicate a keen awareness of the effects of dental health on attendance, academic performance and the direct effects of poor oral health on instruction time. The first quote below describes a first-person account of the presence of severe oral health problems in children and the effects they personally observed on ability to learn:

> I've seen before tooth pain in children, and there is no way in the world that you are going to learn anything if your teeth hurt.

> …[Y]ou can't educate children if they're hungry. You can't educate children if they're not feeling good. You can't educate children if they have a tooth ache or if they can't see.

> Well, I think first of all, their attendance is better [with good oral health] because we know as adults, if we have a toothache or a tooth problem, we can't concentrate.

> … if a child is sitting in class, and they have a tooth ache or they need dental assistance, and they're really not tuned in to what's going on in class...

> … you see kids going to the nurse for tooth pain, you might be saying, "I'm losing class instruction time because kids are suffering from cavities".

Across both cohorts, principals articulated a deep concern for the overall well-being of students in their schools, frequently referring to “my kids” and “our families” and used the term “whole-child”. There was pervasive awareness in the key informants of the broader environments in which their children exist and the concomitant effects on their students:

> When I think of whole child … if you're not addressing the needs of the students, I mean Maslow's Hierarchy. If you're not addressing the needs of the students, they're not going to want to learn, and they're not going to learn for you. You have to address that the student is coming in and last night dad was arrested. Or there was a shooting in the neighborhood and be attentive to the child. You may not address that directly, but acknowledging that your students are coming in with a lot of heavy things on their shoulders and they need somebody to give them a smile, a hug in the morning to welcome them, and to keep them engaged and encourage them in the classroom.

A few principals went further to empathetically describe a perspective drawn from their own families:

> I personally from my population in my school try to cater to the whole child, which means I look at anything that I would look at for my son or my daughter, and for my students, and that's just the way I choose to operate.

Several participants from both cohorts articulated a sentiment that illuminated a dynamic in schools that has been evolving over time from a former, purer educational context to a situation where non-educational elements that address the broader well-being of the child have been insinuated into the educational setting. This has compelled school leaders to adopt progressively broader extra-curricular responsibilities. These five participants introduce the concept that circumstances have been evolving seemingly inexorably:

> I think the school is taking on more of the responsibilities. It's not that it has never been there. It's always been there. It’s just schools are now seeing this, stepping in and saying "Hey, to get this, you're going to have to address this”.

> So, when I think about the whole child, I want to make sure that I've looked at their physical wellbeing, their mental wellbeing, their expressive, artistic, physical... I mean if they need to move, those kinds of things along with their academics. Academics aren't the only thing we deal with anymore.

> I think that some people tend to think that's not their job, but really, we are community schools now, and we are doing a lot more than just educating children, but we are.

> … you're seeing that shift, that paradigm shift, with the thought pattern and the process. Even if you're looking at those numbers, it's becoming, we're getting to the point where that's where they're pushing people, they're pushing us to look at all of those things.…They're pushing towards this whole child approach.

> Yes. Social, emotional, medical attention, everything when it comes to children. So, at one point, and we've seen a shift, at one point children came to school to be educated on math, reading, science, social studies, that was the focus. That's what you got and you went home. Now we're having to deal more with the social, emotional wellbeing of children. Whether they ate last night, whether they were in a home or in a shelter, whether they have clothing. For young ladies, who are menstruating whether they have pads, and we're really having to take on a community approach with children now. So you no longer to come through the door thinking that I'm just going to teach reading, math, science and social studies and go home. It's not like that anymore.

In concert with these evolving school dynamics, many principals across both cohorts described an increasing, intrinsic sense of responsibility for addressing the wholistic needs of their students based on their role as a school leader:

> Well, because that's our babies. I mean, we're like one big family at XXXXXXXXX… Our teachers refer to the XXXXXXXXXX family. So, they're our babies, and so we have the responsibility to take care of them.

> Well, here's the thing. There's a lot of things that I address that I don't really think is probably my responsibility. But ultimately, I know if it's right by children, then I'm going to do whatever it is I can do to take care of them and provide what they need. That's just part of it.

In some cases, this calling went beyond the individual student to their families and the communities in which they served:

> [T]hat is how I see my role as a public-school administrator is, I like to be able to make choices that impact families' health and can elevate situations in my community.

One principal explained how their perspective about their responsibility to address their students' health needs adjusted when they transferred to a higher need school from a school in a more affluent area. They described how it affected their perspective towards their personal obligation to address the needs of the students in the school:

> So I guess my point is the shift has changed for me and for my faculty and staff knowing that while it is the parent's responsibility, we have them eight hours a day, so it becomes our responsibility to make sure that the child is taken care of… So, there has become a shift. Again, I think that depends on where you are because my perspective has changed based on the buildings that I've been in. So, the need is more in this building, therefore the responsibility is greater.

Key informants also repeatedly provided examples of family circumstances that affected access to services for some children which influenced their decisions to host services in schools. Consequently, most principals saw the school as an ostensible location to host non-academic services that could address the needs of the children who might not otherwise receive the services. In some cases, principals went further to describe a motivation to alleviate the burden on parents whose resource issues and constraints they understood, in this example, as being related to their occupation:

> We have them sometimes more than the parents have. Most parents that are third shift parents are working.

In this example, the motivation to provide school-based services was responsive to limited service availability for the family in the area:

> … our families are more likely to participate in programs that happen at school versus taking the time, the inconvenience of taking their children. We are in XXXXXXXXXX, the city of XXXXXXXXX, but it's not like Atlanta. It's a different city type atmosphere. There aren't a lot of resources for children. Dental, there's more. But even therapy-wise, they have to travel about 40 miles for that to happen. It's just a lot more convenient for our families and, ultimately, it benefits the kids. And if I can help prevent them from having tooth decay and tooth issues, then it's definitely, definitely, well worth it.

Many of the principals had already taken proactive steps in their schools to host health services, including dental, because they believed a school-based approach was the most effective option:

> 67 to 70 percent of our kids are socioeconomically challenged. So, they don't get that service if they're not given it at school.

Another component of family life articulated by several principals as a barrier for access to services, particularly in more rural areas, was transportation limitations. This also served to underscore the benefit expressed by principals of locating services on school premises:

> … a lot of my families don't have transportation. So, having it here on site would make a big difference for them.

In another example, a public transit system was not available, alternative transportation options were too expensive and not practicable for some parents. It was notable that this principal knew the precise cost for a one-way taxi ride from memory:

> We don't have any transportation; we don't have buses here. Our school is at least five miles from the city limits from the in-town city limits. If they were to catch a cab to come to our school, it's $28.

Another barrier some parents experience, as stated by one participant, specifically related to distrust of the public systems in place, presumably by undocumented immigrant families. This example, according to this principal, provides an additional reason for hosting health services in the school setting as the trust levels of educational institutions are higher:

> A lot of times with our Hispanic parents there's a distrust sometimes in healthcare professionals because of the situation with ICE and all of that stuff, and so they don't necessarily like to go to doctors and stuff sometimes. So, coming to school would be less of a stress for them to get those kinds of things done.

This statement indicates that principals clearly took barriers to care experienced by families of students in elementary schools into consideration when grappling with how to address non-educational, especially health needs of their students. When considering program expansion, it will be important to understand the uniqueness of circumstances locally depending upon the community in question.

In general, principals expressed a keen understanding of the needs of their students, and there was no difference in the presence of the determinant **whole child** between Cohorts 1 and 2 . They also described a self-imposed sense of responsibility to intervene and were generally proactive about

addressing non-academic needs in their schools. Across both cohorts, principals described overarching goals of the long-term success of "their kids" and treated the circumstances of their students' family lives as relevant context. Their attitudes were positive, and they viewed the health issues facing the school and the students not as insurmountable impediments to a successful child, but as obstacles to be overcome. Good health was more than a means to an end of fulfilling their responsibility to educate the student (whole child) and the school was commonly acknowledged across cohorts as an obvious location for appropriate health related programs.

Theme 2: Creating Opportunity

The option to adopt an SBSP is created by a credible entity offering the program.

For the purposes of this research, as described in the conceptual framework, the determinant **awareness** is simply whether the principal knew or conversely did not know about SBSP at the time of the interview. All of the participants in Cohort 1 had knowledge of SBSP at the time of their interview (**awareness**). While many of the members of Cohort 2 knew what dental sealants were, in several cases due to personal experiences with their own children, none in the cohort had any level of understanding of a school-based sealant delivery program (**awareness**). One could speculate about the potential reasons for this difference; however, the data clearly indicate that basic knowledge of the program's existence is an essential condition for potential future SBSP adoption, which could be remedied by a number of different approaches (**targeting**).

One principal in Cohort 2 succinctly stated that their lack of awareness was the only reason they did not currently have a program in their school:

> For me, it's simple. I don't have one because I wasn't even aware that school-based sealant programs existed.

Notably, several principals in each cohort expressed an understanding of the effectiveness of sealants based on personal, positive experiences with their own children. This knowledgebase also facilitated a positive evaluation of the potential effectiveness and benefit of an SBSP in their school (**complexity**):

> I guess when you think about it, I was aware in the back of my mind because I believe that's what triggered me when my daughter was young … I know that if it would address the kids' dental issues, it would be something I'd be very interested in, simply because our kids need those issues addressed. But again, I've never really even heard of a dental program in a school, so this would be all new to me.

The deductive determinant **awareness** has been demonstrated to be a key component in the adoption chain (Frambach & Schillewaert, 2002). The question becomes one of understanding how to most effectively create awareness. When the principal in Cohort 1 that had adopted an SBSP during their tenure was asked directly about what influenced their decision to adopt the sealant program, their response was unequivocal about both their opinion of sealants, and in addition, about how they became aware of the option to host an SBSP (**targeting**):

> I will tell you, originally one of the things was my personal experience with sealants, … I am 54 years old, and both of my sons are grown and out there in the real world and doing things, and I can remember that they never got cavities when they were younger, and it was because of dental sealants. So, I took them to a child dentist, and I was the kind of mom that would do the, "You're coming back every six months." I was on top of all of the doctor appointments, the dental appointments. That was just who I was, and the fact that they never got cavities was impressive with sealants. So, my own personal experience was pro-sealants. And then when the school nurse supervisor said to me, "Hey XXXXX, would you be interested in this, knowing that they're expensive and that a lot of these people are not carrying dental insurance well?" I was like, "Oh yeah. We could put those on some of our kids."

Upon further questioning, it was revealed that this principal's school nurse supervisor (school district nurse) had attended a professional conference at which they learned of the opportunity to host SBSP. It is important to note that the Georgia Department of Public Health Dental Program was attending this conference for the express purpose of recruiting schools to adopt SBSP (**targeting**). An additional key point from this exchange is the importance of a narrative regarding the proposed intervention that is personally relevant to potential future SBSP adopters when making a case for hosting an SBSP in their school. It is possible, even likely, that other principals have had similar, positive personal experiences with sealants in their own children.

Even with the barest of information provided about SBSP in the invitation to participate in this study, several principals in Cohort 2 expressed a ready motivation to adopt a sealant program in the course of the interview. This is arguably a form of **targeting,** whereby awareness was created by the study invitation where awareness had previously been absent. Two principals in Cohort 2 acknowledged that their curiosity about sealant programs as described in the recruitment materials in part influenced their decision to reply to the invitation to participate in the study. In a follow-up question about the significance of having an offer, one of the two principals provided this:

> I would say that the offer is a big deal to me because now it's on my radar and that is what brought me to what I mentioned earlier. Just me agreeing to have this conversation with you put it on my radar. It's already on a Post-It note on my desk. It's already in my notebook based on the things that we've been talking about in this conversation.

Another principal was even more direct when asked if they were to be offered an SBSP by an outside entity:

> Oh yes, I would say yes. Yes.

The following enthusiastic response about the potential for hosting an SBSP from another participant in Cohort 2 connects the issues of socioeconomic status and health, to relieving the burden on parents, to finally a non-educational goal of healthy permanent teeth, simply by hosting a health program in the school:

> I mean I would love it though because I just feel like if we can be proactive, and we do know in low socio-economical areas dental hygiene is not one of their top priorities, so if it is something that we could place into schools and make parents aware and if it's free or low-cost, then just educating the parents on the importance of it. And then protecting the students because you only get one permanent set of teeth. So, I'm
>
> really big on dental hygiene.

Effective targeting aimed at affecting the adoption of a different health program emerged from questioning another principal in Cohort 2. This principal had been at their elementary school for five years and had inherited an on-site health clinic. Two years prior to the interview they were

approached by a not-for-profit that was interested in partnering with the school to implement a vision clinic to be physically located in the school. This principal described the proposal as a "pitch" with a convincing argument about the potential benefits to students, which resulted in "another classroom that you go in and it's just like going into a community vision clinic". When probed further on their interaction with the not-for-profit regarding the program (**targeting**), they stated:

> It was presented to me … somebody came and asked me if I will be willing to have the vision clinic in the building. That was just an opportunity that fell in my lap.

This partnership that initiated from effective targeting resulted in over 200 children receiving glasses districted-wide in the first year. This is a circumstance that would not have occurred were it not for a concerned health partner taking action to target the principal. It is important to note the co-occurrence of the offer from the not-for-profit and a principal who had a perspective that was arguably predisposed to attempting new initiatives for their students (**innovativeness**). This aspect of adopter characteristics in the adoption process will be explored in Theme 3.

In Georgia, the only SBSPs currently in operation that matched the definition adopted for this study are managed by local public health entities. It was clear in the responses to the questionnaires for this study that schools represented in Cohort 1 had an SBSP due to an established relationship with the public health entity maintaining the program in their school. In the sole case of the one principal who had adopted an SBSP, the opportunity to adopt the program was created by the recent direct interaction between school health personnel and public dental health program staff. Principals in Cohort 1 either had a direct relationship with public health representatives, or knew that their staff did, typically through the school nurse. In one case, when asked how influential public health was in their decision to continue hosting the SBSP, this principal declared:

> Oh, I think that's key. I mean, XXXXX and I have a great relationship. I don't ever hesitate. I know her. When she reaches out in the summertime, that's what's helpful too.

In contrast, only 1 participant in Cohort 2 indicated an awareness of a current relationship with public health but was also not able to provide any details about current initiatives from the partnership. This principal further described their reliance on their school nurse to manage health-oriented partnerships and provided an appreciation that the relationship with public health was satisfactory. Nearly half of the principals in Cohort 2 mentioned the "reputation" of the offering organization, or "being reputable" as an element that would be influential in a decision process. When public health was mentioned across both cohorts, it was characterized as being reputable and potentially being influential in health programming decisions and all current relationships were described positively. When asked if public health could be influential in a decision about adopting an SBSP, one principal simply stated "yes, absolutely". In another example, this principal was asked if they had a connection to public health that might influence an SBSP programming decision, they responded and speculated:

> No. I don't know anybody. I guess if I did, maybe we could have had sealants by now. Nobody's ever even asked me about it. Like, I don't know. This is the first time.

One principal in Cohort 1 who had been in education for 31 years and a principal for 21, articulated an issue they held with the appropriateness of hosting an SBSP in the school setting.

> I struggle with it being an appropriate service for a school setting, if that makes sense. Because I just feel like those services, parents should be taking that opportunity to have those things done now. We have kids that, if they didn't have their teeth cleaned and the sealants done here, that they wouldn't see a dentist for a year. But they're also scared, and they scream, and they cry, and their parents want them to have it done, but then we're here in a school setting with them in our lap and them with a cleaning device in their mouth. So, we struggle with that.

They readily disassociated themselves from the prior decision to have the SBSP in their school by describing it as choice made at the school district level, but simultaneously expressed an awareness for the need and benefit of the service. Further, this informant went on to describe other partnerships with public health including flu vaccine administration and scoliosis, hearing and vision screenings.

Irrespective of this principal's views on appropriateness of hosting health programs in schools, this scenario describes an ongoing, functional relationship with public health.

Research described in the literature review regarding fluoride mouth rinse program adoption in the late 1970s and early 1980s indicated that most school administrators at the time were not in search of a solution to the issue of tooth decay in their students, but rather were targeted by outside groups (**targeting**) (Coombs et al., 1980). The determinants **awareness** and **targeting** delineated in the conceptual framework were determined to be meaningful in the adoption decision process with study participants. The presence of SBSP in Cohort 1 schools was associated with an introduction from or on-going relationship with local public health departments. Conversely, none of the principals in Cohort 2 had ever been offered an opportunity to adopt an SBSP and only one articulated having contact with local public health. While some possessed knowledge regarding the effectiveness of dental sealants, not one had any awareness of school-based sealant programs as an option for their students. These are same students for whom they have expressed a keen awareness of dental health needs. Only one principal in Cohort 1 expressed some reservations about the SBSP they inherited in their school but even they agreed that it was of benefit to their students and continued to partner with public health.

Although participants were not directly asked about public health credibility, it appeared in the responses that public health would have intrinsic credibility and therefor might experience a more direct route to convening with school leadership to create awareness as compared to other entities. This aligns with findings from the literature review which described public health as a "boundary spanner" (Coombs et al., 1981) in the adoption decision process. There were varying degrees of enthusiasm for adoption of health programs, however, there were no principals in either cohort who rejected the notion of hosting an SBSP. In general, across both cohorts, if principals were made aware of a program that could meet a need in their kids' lives, they would at a minimum consider it and, in several cases, accept.

Theme 3: Decision Making

Decision making processes for adopting health programs are predominantly managed by the school district and are potentially influenced by a variety of locally relevant determinants.

Theme 3 describes various decision-making dynamics collected from interview data from both cohorts and also describes determinants potentially present in decision-making processes that could influence an adoption decision. The majority of principals across both cohorts answered they would seek or require some form of permission or approval from district leadership in order to adopt an SBSP. Conversely, two principals in Cohort 2, who were employed by the same suburban metro Atlanta school district, each indicated they had a high level of autonomy in their school regarding decisions, including the potential adoption of an SBSP. However, these two principals expressed slightly divergent understandings of the formality of the authority imbued upon them from their leadership and each indicated they would still inform their leadership if an option to adopt a program occurred. Answers to questions regarding decision making processes were concordant with each other in the remaining sets of principals in the study who were employed by the same school districts.

The one principal in Cohort 1 who had made the decision to adopt the SBSP during their tenure was actually **targeted** by the district nurse supervisor. This is arguably approval to adopt from a higher district authority because of the nurse's district-wide responsibilities for health programming. Unfortunately, this is speculation because during questioning the formality of the process was not probed further with the informant. However, another principal from the same county school system who did not host an SBSP (Cohort 2) clearly indicated that they would seek approval from the district.

For those that indicated a requirement for district level permission, the "approval" appeared in various forms and ranged from securing an informal "greenlight" to proceed or a need to "run it by the district" for input into the decision, to the other end of the continuum which was a directive from the district to host an SBSP, in the previously described example from Cohort 1. This principal provides an example of the less formal approval:

> For something like this, I mean, I would certainly have to get his blessing, but I mean he would be just like me, "This makes so much sense. Let's go." I mean, that's why I say he's an innovative superintendent as well. And so that's why we have a school-based clinic in my school and why a Boys & Girls Club in my school because he understands the needs of the whole child and wants to make sure that we're giving them every, every opportunity to succeed in school. And it's funny that you asked that because he talks about dental health being one of the highest reasons... one of the most reasons that kids are absent.

> And of course, we'll run it by the district, but it's nothing... We don't do anything without allowing the district to have the input.

> I'd have to make sure, again, does the county approve us to do this? Are they good with it? What are their procedures and stuff that we have to go through? But we have a lot of autonomy at the school, so I would guess, as long as you all had your stuff, that we'd be good to go.

This informant from Cohort 1 was described previously provided a perspective from the other end of the continuum, which was a directive from the district to host an SBSP:

> Well, I can tell you that it's not an option for me for that one. That one comes from higher up, from the district office level, that we're participating in that.

On follow up questioning about the steps they would take once they were made aware of and were considering adopting an SBSP, one participant in Cohort 2 stated:

> I'd go to my immediate supervisor, he's the chief and then he would either recognize that he has the autonomy to say yes, or direct me to the individual that can give me permission to do what I'm seeking to do. He always says put it in writing, so I always go to him with the question and then I have what's in writing already there waiting. Because he always says put it in writing. So yeah. So that's the next step.

Two principals indicated that if they were offered to adopt an SBSP the decision about health programs would be taken to a district-wide team that adjudicated decisions about health programs:

> Right, those decisions are made by our school nurse department, our deputy superintendent and superintendent. So, they as a team decide which services are being provided.

> Our school nurse and our director of student supports at the district level kind of weighs those options, makes those decisions, and comes to us with recommendations for the programs that we use as far as our health opportunities for our kids.

The following informants described formal vetting processes for considering new initiatives that resulted in lists of preapproved programs provided to principals by the district. The latter of the two responses below even offer a method to effectively deploy **targeting**:

> What we do each year is we get a running list of things, whether it's fundraisers, whether it's things along these lines, that are approved things. So, this would be one of the things that are approved on the list for us and is acceptable to have as our option, but it is approved whether we want to do it or not… it could be fundraisers. It could be people that want to come in and speak to you about insurance. It could be this type of thing, dental health or whatnot. So, they give us a running list, and it says, "These are approved fundraisers. These are approved individuals that come in and can come in and speak to you." So, all those things are on a list, and as a school it's up to us, whether we say yeah or nay based on what it is.

> …our district is very good, and our superintendent is, "Here are organizations that I support", or "I really am behind and would like you, as principals, to get behind." So, if you could get with the district offices, if they even have approved vendors, approved programs, approved whatever, and work through them, so then, when we see your stuff that our district has already kind of given the green light, or has done some background data looks, and whatnot, we would be more apt to look at your stuff if the district was out there supporting what you all were doing.

In two cases, one in each cohort, the final decision to adopt a program like an SBSP was made by the system school board. In one of these two districts the board only entertained new programs on an annual basis.

> There is a board policy that if we're going to start a new club or any type of extracurricular that it is board approved before the school year starts. So, I can't have like a wild hair in January and say, "Oh, I want to do x club." … All of that is board approved before the school year starts.

> I mean permission, approval, they can be one in the same and sometimes, but yeah. It would have to be approved by our board.

When probed on possible reasons for the necessity for district level input and approval, liability or risk management was mentioned in several examples:

> And typically, we do get the green light for stuff, but if you're doing something medically related, they would want us to be sure, liability-wise, that we're in a good spot, and if anything went wrong, it doesn't fall back on the school.

> I think I have to make sure that I do something with our property risk management people. The school district of course would have to approve it.

Another participant expressed a desire to assure alignment with their leadership's strategic vision:

> I would have to make sure that it is something that will be supported by say our superintendent. I would definitely provide education and supports for our faculty members so that they can understand the importance of it, but I do want to make sure it's something that our superintendent would support. And it aligns with his vision.

In the cases of the two principals who indicated they possessed autonomy regarding the ability to make the final decision about adopting a program such as an SBSP, one described their notification to leadership as a courtesy for awareness, but not a requirement:

> Our superintendent [gives us] a great degree of autonomy and if he feels that we believe that a program is beneficial for our school and then he will support it, but he's not going to encourage us one way or the other. It's very autonomous to what you as the building leader feel like your community and your students' needs … If it's something that would have a large impact as a courtesy, I would say, "Hey, just [so] you know, I want to make you aware that we're doing this in case you receive any parent questions regarding this program", but it's not a requirement.

Also notable, this principal tied their self-described autonomy to an empowerment to meet the needs of their community and students, versus a prescribed educational outcome. The exchange implies a prior discussion occurred between the superintendent and the principal about approval boundaries, and the boundaries appear to be quite broad when applied to the school for which they are responsible. The other principal interviewed from the same school district articulated a similar level of decision-making autonomy or "local control", but in contrast they indicated the presence of an approval step:

> In our district, it's pretty... There's a lot of local control on what we do, so as long as it's not hurting kids and it's helping them, I think it would be approved for sure … in [our district], we have a lot of autonomy to do what we think for our kid's needs.

When probed to describe the requirement of the approval mentioned above, they did not articulate the presence of a formal process and characterized their motivation to include leadership similarly as their colleague in terms of awareness and added validation:

> I don't know if have to, but I would. So, I don't think there's any time... Like anytime that we implement, if we're talking about an academic program that we start, we'd tell the office of academics and accountability. So, I would handle it the same way with getting permission through that office. Just so one, that they're aware. And two, like I said, if they have research on it or if they know people that they can reach out to, then it's helpful … And just so that they're aware, I mean, because, yeah.

As postulated in the conceptual framework, select determinants were influential in the decision processes for adoption considerations of health interventions in elementary schools. Some determinants (**complexity, competing priorities, resistance**) influenced decisions to adopt programs, but broadly across both cohorts the effects could be modulated by the presence of other determinants (**risk reduction**, **innovativeness**). Given that none of the principals in Cohort 2 gave any indication that they would reject an SBSP if targeted, coupled with the profound significance of district level involvement in the decision processes, the consequence of these determinants and their interactions may not be as relevant in the long run. However, given there will not be a one-size-fits-all approach to affecting increased SBSP adoption in Georgia's 186 school districts, it will be essential to understand local dynamics to maximize effectiveness of targeting.

Complexity was defined as the principal's attitude towards the proposed program including effectiveness, cost, funding availability and the degree of difficulty to conduct the program. Both cohorts expressed concerns related to the determinant **complexity** with equal distributions across the cohorts. The top three concerns in descending order were, (1) cost of the program, particularly if the cost was to be passed on to parents, (2) physical space limitations in the school and (3) impacts on staffing. In public health run SBSPs in Georgia, schools incur no monetary cost, however temporarily dedicated space is needed to conduct the clinic and even in the most efficient examples there are some impacts on school staff during clinic days. Cohort 1 principals characterized the impacts as

minimal. Remaining informant concerns related to post-adoption implementation including logistics of the program and consent processes.

Five principals, one from Cohort 1, indicated the reputation of the offerer was important to them, which boded well for public health agencies taking on the role of **targeting**, as discussed previously. In general, across the cohorts, concerns were framed as contingencies to be overcome rather than absolute barriers to adoption of an SBSP or SBSP-like program. Further, as will be discussed, these perspectives can be ameliorated by other determinants, such as **innovativeness** in the principals and **risk reduction** by the offering program.

Competing priorities is the level of influence of the principal's potential lack of motivation to adopt a new program based on limited resources or external or internal pressures. Segments of text coded for **competing priorities** emanated from questions related to concerns regarding or influences on adoption, as described in Chapter 5. The two most common answers from respondents, also representing the vast majority of responses from both cohorts, were foremost related to motivations to protect learning time or class time, followed by perceptions of "lack of time" in the school day. Each of these sentiments are logical given principals' professional responsibilities; however, many principals simultaneously expressed a countermanding perspective that they would not reject an opportunity to address a child's need and would view options in balance with expected benefits to the child, as expressed by this principal in Cohort 2:

> But something like this or if it were anything else that may be presented to me, if it's something that is going to contribute to their well-being ... I have a Master's in Health Promotion ... so I also understand the vital importance of certain aspects of your health and then how those impact your ability to learn, your ability to focus. So, I look at overall wellness.

Several other principals from both cohorts spoke about applying balance in their thought processes. In the following quotes, perspectives regarding instruction time were not expressed as being inviolable, especially if there was a felt benefit to their students:

> So a lot of times if it's extracurricular as in the arts, we bring a lot of things in for our schools, or just like supportive for their health, we balance that out and sometimes we may sacrifice a little bit of instructional time because there is a permanent need for it.

> However, at the same time, we try to balance academics and extracurricular things, whether it be extracurricular as in some of the things we currently offer like basketball, cheerleading, STEM, and then other things that would be a benefit to our school and our students like this dental program, like hearing/vision. So again, I kind of just tease that out and balance it.

> So more than likely, if it's extracurricular, not going to be an academic benefit, but it certainly could be health and wellness benefit, a social emotional benefit, a character development, or leadership development benefit, a benefit to their general engagement in school and learning. So, is it a program that would build creativity or build innovation, build students sense of self through the art? All of those things I would consider, and that is equally important to what students are learning at school. But we would want to always balance that with, it's ultimately our greatest priority to prepare students academically for what their next educational steppingstone would be.

When exploring impacts to potential decisions based on a perception of "lack of time" in the school schedule, terms such as "being overwhelmed" or having a "full plate" were expressed. It appears that an opportunity to adopt a beneficial program would be screened and passed up, rather than an outright rejection of an offer, which has clear implications for designing effective targeting efforts. Speculatively, this screening behavior, particularly of offers in email format, was likely a major factor in the poor response rate for this study:

> I mean, being very honest with you, when I had that initial email from you about wanting to do this interview, I almost hit delete because I'm like, "That's not something I have to do. It's not a requirement."

However, in the following sentence of this principal's answer, they provided the commonly expressed countermand based on a motivation to help, in this case a random graduate student, but more often their own students:

> But, I'm like, "You know what, this'll be helpful and it's something we offer. So why not contribute to him getting this doctoral degree and sharing my insight on what we offer here."

This suggests **competing priorities** are not an insurmountable state and perceptions of **competing priorities** could be influenced by effective targeting. Additionally, targeting should consider other intrinsic conditions including the offeror's reputation as a means to mitigate the impacts of competing priorities:

> And all of it is good, but you just can't do all of it. So, you kind of get overwhelmed, and a lot of times, you push things off to the side or don't even reply because it's so much to deal with. But if you recognize the company, or recognize the name or the person, then you're more apt to maybe dig a little deeper if you've had good success with them in the past.

In many instances across both cohorts, when describing the effects of **competing priorities**, participants' answers were not about themselves, but were speculative thoughts about why other principals might not adopt a program like an SBSP, suggesting the potential negative effects of this determinant may not be pervasive as demonstrated by this principal from Cohort 2:

> Have schools told you no they don't want to? … I would imagine that there are people, not myself, and I don't ... you're not going to mention my name. There are some principals who probably could care less, and I don't mean that in a negative way. I mean that their plate's full of principal stuff, probably things bigger than worrying about children's sealant on teeth. You know?

And also, in this example from Cohort 1:

> However, I can see where it depends maybe on where your heart is about what you're doing. And like you say, if you're just focused on the academics and you've got to get this done and maybe you don't see the benefit of it, or if you're in an affluent situation where you don't need that because it's not a need in your school, then yeah, that would make sense. But I can say most of your Title I schools, I can't imagine them not thinking this is a good idea. So that might be a measure, Title I, because then you know there's a certain level of poverty within the school.

The effects associated with **competing priorities** on a principal's decision to adopt were less significant than postulated in the conceptual framework, however this is based on a small number of principals. **Competing priorities** were clearly a factor in decision processes, but as with **complexity,** they were more so factors in an evaluation process, and not always outright obstacles to adoption. Finally, there appeared to be a categorically different attitude towards considerations of health-

related programming (**whole child**) versus other extracurricular activities. However, this distinction was revealed in the analytical process and was not explored during the interviews.

Over half of participants stated they did not anticipate experiencing **resistance** from internal or external individuals or entities that might negatively influence the decision to adopt programs like SHSPs. The question posed to Cohort 1 was in terms of a hypothetical offer for a dental program, with the exception of the one principal who did adopt and only one principal in Cohort 1 expressed any potential for conflict:

> We have a lot of community-based programs that our kids feed into, so we try not to step on the toes. We're a very small community as you probably know. You pulled the statistics down, so we try not to step on the toes of those community agencies that are trying to run programs too, so...Just, is there a need and is it offered anywhere else? Not to step on those toes. And not only a need but what would the benefit be for our kids?

The opportunity to probe further with this informant on processes for ensuring alignment with the community was missed, however the informant was explaining this situation was possible and not inexorable.

When probed about people or groups that might resist the adoption of an SBSP, other responses were widely provided in hypothetical terms. Parents were mentioned by three principals in Cohort 2; however, their answers were directed at a potential lack of participation, versus true objection to adoption. Teachers as a group were mentioned by one principal in Cohort 2, but they also framed it as only a possibility; that the group would be engaged, and the decision would be managed. When contemplating the lack of perceived **resistance** to an SBSP in Cohort 2, it is possible this is simply untested because SBSP adoption has not occurred. However, based on the experiences in Cohort 1 it does not seem likely that it would be a pervasive issue.

Principals from both cohorts clearly indicated that **risk reduction** played a role in the decision process and in some cases, it was expressed as an essential deciding factor, requiring partners to be punctual, organized and prioritizing clear communication with the school. The more equipped an offering program was to manage the associated workload, the better the chances that the program

would be adopted, and further, to be invited back during future school years. As stated by these members of Cohort 2:

> Yeah, that's a big one for me. If it's not easy, we're not doing it.
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> ----
>
> Well, I don't put any more work on the staff than what they already have. It's, I mean, teachers do way more than what they get paid for anyway. So, I would say almost 100% other than just some sort of implementation at the school level, I would think that everything else would need to be done with whatever program we were purchasing.
>
> ----
>
> … is it easy to do? Is it going to take a ton of human capital on my end to do it because I don't have human capital to spare? Or is it going to be something that's, "Hey, we've got a whole great process, our process is efficient, effective. We come in, boom, we're out and it's all done."
>
> ----
>
> That's high on the radar because we have limited, our staff is dedicated to making sure that our students are monitored and being educated. So, I wouldn't be able to lend staff to that particular thing, but because they can come in and facilitate it that's a win-win for us.

Commentary from Cohort 1 relevant to risk reduction regarding their SBSP partnerships was all favorable including this statement made by one principal:

> Oh, well, it's got to be organized, and it [SBSP] definitely is.

Evaluation of the determinant **innovativeness** sought to assess the presence and effects of a principal's predisposition to attempt new initiatives in their schools. The characteristic was present in many principals in both cohorts and was also found to be influential in decision processes. Expressions of **innovativeness** emerged as a positive attitude about not allowing obstructive details to overcome adoption of new innovations, particularly when the principal understood that the innovation would

benefit their students. Phrases including “make it happen” or “find a way” were common regarding approaches to needs for problem solving. This principal from Cohort 1 stated:

> But if the value of what was being offered to me seems like a really great experience for these kids, I would somehow find a way to make it possible.

This principal described how their clinic day planning with the mobile for-profit dental provider discussed in Chapter 4 would adjust based on developing circumstances. On probing about the nature and impetus for their flexibility, they stated:

> If my kids could benefit number one, we're going to make sure they get what they need.

The following examples from both cohorts provide an appreciation of how **innovativeness** can work in a decision process to overcome and remove obstacles:

> I am fortunate in some ways it's a blessing and a curse that I love to try new things. For me it's like if I can find the space and it's going to be a benefit to my students, we're going to make it happen, we'll figure it out. Then we work on all the details after that. That would really be it.

> So, I've kind of learned maybe how to finagle some things around, not in a bad way, but in a let's remove the barriers way.

> I'm one of those innovative principals. Give me something that makes good sense and we can do it.

This principal form Cohort 1 had this to say about their SBSP partnership with public health:

> I'd give up my office before I would not have her [Pubic Health] come.

The apparent benefit of **innovation** in the adoption decision process is that it can act to counteract negative perceptions about the program (**complexity**), but speculatively it will not eliminate the requirement that the offerer be reputable, organized and effective communicators (**risk reduction**) and that there be a **perceived need** for the program. In the decision process, one also cannot control for **innovativeness**, but it could be exploited if found to be present.

Discussion

This study was designed to explore the determinants that influence the decision to adopt a school-based dental sealant program by elementary school principals in Georgia that predominantly serve low-income children. The most significant findings of this research include: (1) principals are very aware of the needs of and are concerned with the well-being of the children they serve; (2) lack of awareness of SBSP is a significant barrier to adoption and principals who do not currently have an SBSP in their school would consider adopting one; (3) for those principals interviewed, the processes and authorities for program adoption decision-making generally reside at or at a minimum include the school district; (4) public health is a major contributing factor to the presence of SBSP in elementary schools in Georgia. In an SBSP adoption decision scenario, these four factors are both interrelated and modulated by other determinants as discussed.

The fact that principals have an acute understanding of the needs of their students, including health care needs, coupled with an intrinsic concern for the overall well-being of the children they serve, demonstrates in the sample of principals interviewed there is pent-up demand for dental health programming, i.e. SBSP. The existence of pent-up demand in the study participants is not generalizable to the universe of elementary school principals. However, the data do indicate that there are many who would adopt an SBSP if asked and the conditions as discussed previously were met.

A fundamental missing component of effective expansion of SBSP into more elementary schools is an invitation by a credible organization to adopt the program. The complete lack of awareness of SBSP in Cohort 2 is a significant indicator of this circumstance, in addition to the fact that many of the Cohort 2 principals indicated they would consider adopting an SBSP if asked. Furthermore, the fact that only one of the principals in Cohort 2 had a relationship with public health, which was the obverse

of Cohort 1, is the most significant difference between Cohort 1 and Cohort 2. Public health was described as being a reputable organization by many principals in both cohorts, which matches the results from the literature review conducted for this study. Principals broadly expressed that effective targeting by a credible entity would address the lack of awareness of an opportunity to adopt an SBSP and public health is clearly well suited for the role.

There is variability in decision-making processes across the participating school districts. The principals from one district represented in the study evidently had greater autonomy than the remainder, but the most efficient target seems to be at the district level. In Georgia, school district personnel (e.g. superintendent, supervisory school nurse) are likely a more effective loci for targeting. This is valuable information given that by statute in Georgia the county superintendent of schools is a member of the county board of health (OCGA 31-3-2(a)(2)). This could provide the entrée needed for the local health director to expand SBSP. However, this does not eliminate the principal as a possible target. In only one case in Cohort 1 did the principal indicate they were left out of the decision-making process regarding adoption of an SBSP. Other principals who currently host SBSP could have had the same experience, but this is speculative.

There are a host of determinants that can influence the adoption decision, the primary example was **risk reduction**. Principals conducted an on-the-fly break-even assessment of impact to the school operations versus perceived benefit to the children, but irreducibly, the offering program must be perceived as reputable, organized and prepared to minimize or eliminate the impact to the school. Issues raised related to **complexity** were typically offhand and mainly not applicable to SBSP except for concerns about physical space limitations. **Competing priorities** were certainly a factor in the decision process, however principals' own statements often contradicted the impacts they raised about this determinant with their own sense of **innovativeness** and it is conceivable that effective **targeting** and **risk reduction** could overcome their concerns about competing priorities. Finally, **resistance** to adoption of SBSP was not found to be a significant factor among respondents. This quote from one principal in Cohort 2 provided an interesting summary of their thought processes that references elements of **complexity**, **risk reduction**, **perceived need** and **innovativeness:**

But as long as we have space (**complexity**) and there's somebody managing it (**risk reduction**) and it is going to provide my students with a service they need (**perceived need**), we're all for it (**innovativeness**).

CHAPTER 7: PLAN FOR CHANGE

This research focused on determinants relevant to the decision about whether to adopt a school based sealant program, one component of an implementation chain of events (Frambach & Schillewaert, 2002); it did not deviate into post-adoption implementation issues. However, this study revealed that the decision process about adoption is not the primary barrier to adoption. The underlying reasons for poor adoption are centered around awareness and having the necessary resources to effectively expand SBSPs. Furthermore, the study results demonstrate there is unmet need for dental health intervention in elementary school children in Georgia and that there is clear desire in participants to adopt programs in their schools to address the need. An opportunity has been revealed for increasing awareness of SBSP and thereby the probable adoption of a school-based intervention that would effectively meet dental health need across the state. To create an effective, sustainable Plan for Change (PFC), post adoption components of implementation will be also be included in this chapter and will be contemplated through the application of an implementation framework.

The only entities that are currently managing SBSP in Georgia were found to be local public health authorities. These programs are coordinated by the state dental health program through partial funding, policy and clinical guideline standardization, training and data sharing. Primarily for this reason, this PFC presents a set of recommendations for public health to affect the adoption decisions and successful implementations of SBSP by elementary schools in Georgia. The recommendations focus on understanding the need, required resources, relevant stakeholders, policy implications, evaluation strategies and contextual constraints influencing the desired change. It is possible that an entity other than public health could use these recommendations to affect expansion of SBSPs in Georgia's elementary schools, however for the reasons outlined above, this PFC will be tailored for a potential governmental public health expansion initiative.

A finding of this analysis relevant to the PFC was the discovery that the principal is likely not the most efficient target for increasing awareness of SBSPs. This is due to the overwhelming number of principals in both cohorts who required permission from the district in some form to proceed with intentions to adopt an SBSP or similar program. As stated previously, this does not imply that the principal is not an effective target, and arguably should not be excluded, as many participants demonstrated an innovativeness that could be helpful in promoting adoption to their leadership. However, targeting the superintendent of the local school system or others at the district level would potentially eliminate steps and will be a consideration in the recommendations. Furthermore, as has been discussed, it is significant that the superintendent is a statutory member of the local school board, arguably designed for just this sort of challenge, which will also factor in the recommendations.

The desire described by the study participants to address the dental health needs of their students was generally not addressed by local public health authorities, which strongly suggests that dental health, and in particular SBSP expansion, is not a priority for public health. Notwithstanding, the author has a functional, professional relationship with the current State Dental Health Director, who has been an ardent supporter of this work. This partnership has inherent benefits, but there are also limitations. In many cases pivotal, priority decisions are made at a higher level in DPH. In addition, local public health authorities also have autonomy with priority setting. Even working within the current scope of authority of the GPHDP, the agreement and cooperation of local public health districts is central, given their level of local control. Methods to work within these limitations are considered in the PFC recommendations.

Lastly, the study results indicate that there is substantial pent-up demand for oral health services in elementary school children. However, this in no way implies that there is a commensurate supply available to meet an increase in demand. This dissonance creates an immediate challenge for designing a strategy to increase awareness of a potentially desirable program for which the resources do not currently exist. As discussed in Chapter 4, funding sources for SBSPs have been steadily declining for years and are currently predominantly supported by Federal or local fund sources, versus dedicated state appropriations. Furthermore, as of this writing, Georgia is embroiled in the State's response to the COVID19 pandemic and the Department of Public Health is facing significant, imminent

state budget reductions due to the outbreak's impacts on revenue, which portends a relatively difficult argument to be made about new funding for SBSP expansion.

Adoption and Implementation Framework

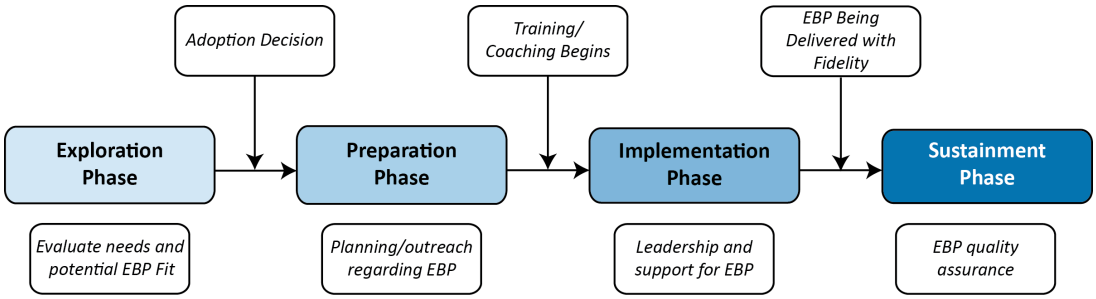
To maximize the prospect of successful adoption, implementation and sustainment of SBSP, an implementation framework will be described in the PFC that addresses the challenge in implementing an evidence-based practice (EBP) such as school-based sealant delivery program (Gooch et al., 2009). Implementation of "innovative human service technologies is generally considered to be more complex than implementation of other types of technology, due to the fact that human service technologies are delivered through the actions of individuals and organizations, which exist within complex, multi-layered social contexts" (Aarons & Hurlburt, 2011). The primary implementation gap relevant to this PFC is that sealant programs, which are an "innovative human service technology", are not widely deployed in elementary schools in Georgia.

There are numerous factors that affect the adoption, implementation and sustainment of SBSPs in elementary schools, a proportion of which are peculiar to each target school or district. Implementation frameworks facilitate the delineation of locally relevant barriers and facilitators (Aarons & Hurlburt, 2011) and "provide a broad set of constructs that organize concepts and data descriptively … [and they] … provide a prescriptive series of steps summarizing how implementation should ideally be planned and carried out" (Bauer, Damschroder, Hagedorn, Smith, & Kilbourne, 2015). Implementation frameworks assist with describing appropriate processes and outcomes to evaluate, which can occur "at multiple levels of the social and organizational context that potentially influence the process of translating research into effective improvements in practice" (Aarons & Hurlburt, 2011). An implementation framework should also have clear underlying logic linked to an implementation strategy, which further must be acceptable to stakeholders, feasible in the proposed setting and comprehensive enough to be adapted and scaled as needed (Hamilton & Mittman, 2017).

In the design of this PFC, the Exploration, Preparation, Implementation, Sustainment (EPIS) framework will be applied. The EPIS framework was originally designed with public sector care delivery as a focus. It facilitates the organization of a strategy and provides a straightforward, phased

approach to addressing the adoption and implementation of a proven, evidence-based oral health intervention (Aarons & Hurlburt, 2011). As the authors note, "[EPIS] offers a framework that articulates variables hypothesized to play important roles in achieving effective implementation of EBPs" (Aarons & Hurlburt, 2011). The EPIS framework phases proceed in a temporal order, however there is often some overlap of activities between the different phases which implies the need for continued engagement across the process (Figure 6). Additionally, the EPIS implementation framework fully considers the 'creating awareness' and 'adoption decision' steps in the chain of events, which has clear ties to the study's conceptual framework adapted from Frambach.

Figure 6: The EPIS Framework Adopted from California Evidence-Based Clearinghouse for Child Welfare



The four phases of the EPIS framework each assess a series of factors in two areas the authors describe as the outer and inner context. The outer context represents larger, typically external factors that can affect implementation. These can include governmental policies and requirements at all levels, funding availability, and inter-organizational relationships. Various state and local agencies (GaDOE, GaDPH, GaDCH) and related constraints including budget and policy priorities are components of the outer context in this PFC. The inner context "represents what is happening within a community or organization that is implementing an evidence-based practice, such as staffing, policies and procedures, and organizational culture and climate (Aarons & Hurlburt, 2011)." The schools, school districts and local public health authorities are major components of the inner context in this PFC.

In the Exploration Phase, participants consider options across both the outer and inner contexts for EBP. Considerations include whether a service delivery system, such as health care, social services,

education or other community organization would find a particular clinical or preventive intervention useful and could solve a program or health outcome problem and a decision to move forward is made. The exploration phase in this PFC is somewhat foreshortened, due to the existence of the appropriate EBP; however, the EPIS framework is also cyclic, iterative and locally relevant. This is especially useful as there is recognition that implementation may not always move linearly through adoption, implementation and sustainment phases (Aarons & Hurlburt, 2011) and as the approach is considered across all 18 public health districts and 180 school districts in the state.

Once a decision has been made to adopt, the Preparation Phase focuses on identifying potential barriers and facilitators of implementation at the outer and inner contexts and plans are made for integrating the evidence-based practice into the service setting. The critical outputs needed across the outer and inner contexts include assessments of potential implementation challenges, establishing collaborations, policies, funding, and processes and procedures. Additionally, potential adaptations to stakeholder systems, organization, and the intervention are considered. A component of this phase is "planning of implementation supports" including evaluation and quality improvement plans.

In the Implementation Phase the chosen EBP to be adopted is implemented and the groundwork laid during the Preparation Phase is put into action. Personnel are recruited and trained, stakeholder groups are established, and support processes including program evaluation and quality assurance are initiated. Often this is the first time that change is visible to the community (The California Evidence-Based Clearinghouse for Child Welfare, 2014). In the final Sustainment Phase, the intervention has been successfully implemented and is ingrained in the organization. There is stable funding, and effective evaluation monitoring and quality assurance processes are in place.

Recommendations

The findings and themes outlined in this research are used to inform the basis of this PFC, which are a set of recommendations to public health for the expansion of SBSPs across Georgia. The five PFC recommendations delineated below (Table 8) were selected from a number of possible EPIS activities based on several criteria: They are all standard and necessary exercises in any pre-

implementation planning activity; they do not currently exist in the record as content specific to the current circumstances related to SBSPs in Georgia; and each are accomplishable within the current scope of authority of a volunteer coalition of interested stakeholders. The five recommended activities lay the groundwork for implementing expansion should the necessary resources, cooperation and approvals be provided. Many of the other standard activities suggested in the EPIS Phases are already known or are beyond what is practicable for the scope of this PFC (Table 8). For instance, activities related to training and hiring were not considered to be additive. Job descriptions, role responsibilities and training plans currently exist and would simply need to be modified based on outputs from the five recommendations.

Table 8: Key Steps in Each EPIS Phase Cross Referenced with PFC Recommendations - Adapted from Walsh et al., 2015

EPIS Phase	EPIS Activity (per Walsh et al)	Five PFC Recommendations Across EPIS Phases*
Exploration	Form an Implementation Team	Create Steering Committee*
	Conduct a needs assessment	Needs and Change Readiness Assessments*
	Identify the problem	N/A - Problem is known
	Narrow the focus	N/A - Problem is known
	Identify potential solutions	N/A - EBP is Identified
	Determine program fit	N/A - Fit is Understood
	Create a written summary	Beyond PFC Scope
Preparation	Ensure leadership buy	Beyond PFC Scope
	Work with stakeholders	Stakeholder Analysis*
	Develop implementation support systems	Fidelity Monitoring/Program Evaluation Plans*
	Identify viable funding streams	Financial Analysis*
	Ensure the chosen EBP is a good fit	N/A - Fit is Understood
	Develop timetables	Beyond PFC Scope
Implementation	Verify buy in	Beyond PFC Scope
	Ensure priority	Beyond PFC Scope
	Complete training	Beyond PFC Scope
	Prepare materials	Beyond PFC Scope
	Monitor fidelity to the EBP	Fidelity Monitoring/Program Evaluation Plans*
	Collect and evaluate outcomes	Fidelity Monitoring/Program Evaluation Plans*
	Explore scale up in the service system	Stakeholder Analysis*
Sustainment	Funding and support	Financial Analysis*
	Ongoing training needs	Beyond PFC Scope
	Ongoing fidelity monitoring	Fidelity Monitoring/Program Evaluation Plans*
	Outcomes monitoring	Fidelity Monitoring/Program Evaluation Plans*
	Making refinements	Beyond PFC Scope

The development of a state level initiative within the public health governance structure is the most direct approach to effective SBSP expansion given public health's status as a reputable organization. Additionally, the replicability of current local level SBSP experiences, and the presence of public health authorities and service delivery flexibilities through hygienists working under protocol heavily influence this approach. Therefore, the recommendations are aimed at state level organizations and leaders.

The author will be a full participant in activities recommended in the PFC, as well as other activities potentially decided upon by a future formal steering committee. The author also commits to serve as a consultant to the GPHDP as an informant related to the findings of this study. According to Northouse (2016), effective consultants are leaders who "…have applied adaptive leadership at all levels in many different kinds of organizations. In particular, it has been an approach to leadership of special interest to people in … health care…" (pp. 277–278). As a consultant, the author will deploy adaptive leader skills of active listening, inquiry, and problem-solving.

1. Create a Steering Committee

A primary activity delineated in the Exploration Phase of the EPIS framework is the creation of an "implementation team" (Walsh, Reutz, & Williams, 2015). The author will engage with GaDPH dental program leadership to design and initiate a strategically oriented implementation team, or steering committee, comprised of membership from GaDPH, GaDOE, GaDCH (Medicaid) and other select Non-Governmental Organization partners such as the Georgia Dental Hygienist Association, the Georgia Association of School Nurses and the Georgia School Superintendents Association. Members of several of these organizations have been actively engaged with the author throughout this research. There are undoubtedly other relevant and appropriate partners to include, however initially the author's recommendation is the committee should balance efficiency with inclusiveness (Walsh et al., 2015). There will be sincere and requisite plans for expansion of membership from other critical constituencies as planning activities are conducted and in particular as they progress towards implementation.

This recommendation is considered with the potential of either having or not having active sponsorship of executive leadership of the initiative. It is clearly optimal to have agency leadership "buy-in" and engagement at the highest levels. However, should active agency sponsorship be lacking, the scope of SBSP expansion planning activities would be commensurately limited to the inherent spans of authority of and cooperation amongst program level leaders across the agencies on the steering committee. If it is eventually determined to be necessary, leadership should be considered an early target audience for increasing awareness and thereby a focus of a genuine attempt to secure endorsement and active engagement, an activity recommended in both the Preparation and Implementation Phases. Regardless, it is the author's contention that significant advances on the recommendations could be accomplished within the spans of authority of those currently engaged.

The author's organization (GaDCH) is the state's Medicaid agency and is a sister health agency to the state public health department. The author has the support of his agency and has already functioned as a "boundary spanner" (Coombs et al., 1981) during past public health work experience and through the conduct of this research. The author is intent upon affecting policy through influence, information sharing and appropriate access to service claim data and could expand this activity as requested by the steering committee. Additionally, the author is available to provide support and assistance to organizations that desire to participate under the guidance of the steering committee in planning for the adoption, implementation and sustainment of school-based sealant programs.

The planning activities in the remaining recommendations will be under the purview of the steering committee. As discussed, the five recommendations are not an exhaustive list but rather are core components for a strategy to expand SBSP that are fundamental to standard planning activities within the EPIS framework. Each recommendation describes the general scope and content of what would need to be completed and the reasoning for its necessity but does not delve deeply into the design of how the committee might accomplish these items, due to it being beyond the scope of this PFC. Finally, while not provided as a discrete recommendation due to unknowns about scope of authority and participation beyond those currently committed, the steering committee would need to develop a general plan timeline for initiating the expansion recommendation activities based on level

of approval from leadership and resource availability, including funding and local public health collaboration.

2. Conduct a Needs Assessment and a Change Readiness Assessment

To guide the SBSP expansion activities, it is essential that planners achieve a clear understanding of need across the state at the school level for a host of parameters. Additionally, it is paramount that planners have an understanding of receptiveness to and readiness for adoption in the primary target audiences, elementary school principals and their district superintendents and local public health leadership. Recommendation 2 is comprised of two parts, both of which are activities encompassed in the Exploration Phase of the EPIS framework; a needs assessment and a change readiness assessment. Components of each effort also serve as a foundation for metrics and measures to be included in future evaluation strategies.

The needs assessment will provide a broad descriptive and statistical analysis to guide planning geared towards maximizing benefit to geographic areas that could actualize the most improvements in oral health. Extant data can be obtained from a wide variety of publicly available sources that would effectively frame, at both the school and school district level, and by public health district, where the highest need exists. Sources include, but are not necessarily limited to:

1) Free and Reduced Priced Meal participation – this metric serves as an accepted and effective marker for need based on family income and is also a standard data element in scholastic needs assessments. Not coincidentally it was the basis for describing need in participant selection for this study.
2) Dental Provider Shortage Areas – useful for targeting efforts using the logic for expansion into locations where there are no dentists that accept Medicaid or no dentists at all.
3) Medicaid Enrollment Data – as described in Chapter 1, Medicaid recipients have dental care access challenges so enrollment data could indicate areas of need. In addition, higher Medicaid enrollment could indicate greater opportunity for an SBSP, as Medicaid serves as a funding source to offset costs for local public due to hygienist's reimbursement for sealant services.

4) Medicaid Utilization Data – higher rates of acute care in the Medicaid population could indicate greater need for preventive services. This metric could also be a component of an evaluation plan.
5) School Absentee Data – Absenteeism data are a potent tool for public health decision making (Healthy Schools Campaign, 2019). The Governor's Office of Student Achievement (GOSA) tracks absenteeism and other school-based metrics. Their data do not include the reasons for absences. However, given that dental health is the number one reason for absences across the country there is a strong argument for tracking absenteeism over time.
6) Ambulatory Sensitive Conditions – acute dental care provided in an Emergency Department in the age range of interest (0 – 19) would add to the layers of data. It is easily accessible and would be a metric of interest to CMOs (cost savings). The number of Emergency Department visits for caries-related reasons is a standard quality metric with dual utility in the evaluation (Dental Quality Alliance, 2014).

The author has a background in health assessment and analytics and under the direction of the GPHDP and the Steering Committee will play a central role informing and participating in the assessment. Further, components of this assessment fall squarely within the author's job responsibilities and can be accomplished as a part of professional duties during normal work hours, time permitting. The results of this assessment (and SBSP expansion) will directly benefit the agency through cost offset from acute to preventive care and cost savings from fewer acute care episodes.

The second component of Recommendation 2 is to conduct a change readiness assessment (Weiner, 2009) of Superintendents, elementary school principals, and local public health leadership. According to Weiner, a failure to establish readiness for change in an organization accounts for half of "all unsuccessful, large-scale organizational change efforts". The change readiness assessment would seek to understand the level of awareness of and perceived need for dental health interventions in schools including views, attitudes and perceptions about the intervention. There are publicly available decision-support tools to aid in selecting a set appropriate measures for the assessment (Khan et al., 2014). The survey would also collect information relevant to Rogers adopter characteristics in order to parse where respondents fall on the innovation curve (E. Rogers, Singhal, & Quinlan, 2009). According

to Rogers, half of potential innovation adopters are in the first three categories (innovators, early adopters, early majority versus late majority, and laggards), which will facilitate prioritization of targeting efforts based on likelihood of innovation adoption.

The survey would include questions designed to collect information regarding administrative steps required locally to achieve a final adoption decision. The relevance of this was illuminated by the experiences described by two separate participants who indicated board approval would be needed for final adoption approval. In Chapter 4, one source described a requirement that all health partnerships require a Memorandum of Understanding (MOU) be executed at the school district level. Knowing where these additional requirements exist will help guide planning and expansion activity.

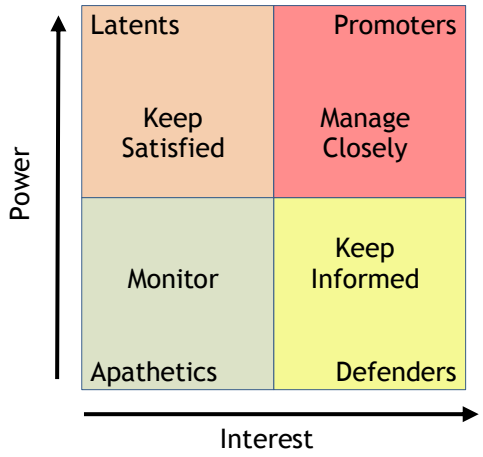
This effort would require thoughtful survey design and input and guidance from GaDOE. The author has a background in survey design and a professional connection to an expert at GaDOE who has over thirty years of experience and a deep research background. This expert has also been an advisor and strong supporter of this dissertation research. Additionally, the author has enlisted the assistance of the Executive Director of a Georgia based non-profit a whose mission focuses on child well-being issues in Georgia. Each of these two individuals have direct access to the statewide education community and were instrumental intermediaries with recruitment of study participants. Each has indicated their support for further efforts.

3. Conduct a Stakeholder Analysis

There is a panoply of audiences in both the inner and outer contexts of the EPIS framework across multiple sectors in Georgia that will intersect with SBSP expansion and are very relevant to this PFC. An essential, ongoing activity to be overseen by the Steering Committee will be stakeholder management. A comprehensive stakeholder strategy will guide engagement once expansion activities initiate. Conducting a stakeholder analysis is not a complex exercise, however it is a fundamental activity in the Preparation Phase of the EPIS framework as well as in any policy analysis. As recommended by the EPIS Framework, stakeholders should be engaged and monitored, and the analysis results should be updated on a regular basis.

Stakeholder analyses begin with an iterative, brainstorming discussion with a set of knowledgeable, involved parties, in this case the Steering Committee. Structure should be applied to the resultant content, and one approach would be through the use of the Mendelow Power–Interest Grid (Figure 7), which assesses stakeholder expectations against their relative "power". The approach creates structure around the identified stakeholder's likely interest and the potential of a stakeholder to influence other stakeholder groups. Alternatively, it will reveal stakeholders that may resist or interfere with planning and expansion activities (Mendelow, 1981).

Figure 7: Mendelow Power–Interest Grid



Once the stakeholders are identified, the Power-Interest Grid enables their categorization into four quadrants; Latents, Promoters, Apathetics, and Defenders. Understanding in which quadrant a stakeholder falls will allow planners to evaluate level of effort needed for engagement across the groups. Promoters are high power, high interest stakeholders and must be engaged with fully. Latents are high power, but less interested stakeholders and will require less effort than Promoters due to a lower interest. Defenders are low power but are highly interested stakeholders. This group can be engaged and utilized on more tactical levels when plans are being executed. They can serve as sentinels when issues arise. Finally, apathetics have low power and are less interested people who would need to be monitored, but not excessively engaged.

The author is clearly a stakeholder in the strategy to expand SBSP and is employed by a stakeholder agency. The author has experience with stakeholder analyses as a component of policy

analyses as both a participant and as a facilitator. This level of activity can be conducted with the proposed steering committee membership during the course of normal work hours and is not time sensitive. This means that this activity could be conducted while other activities are being planned and performed.

4. Develop Fidelity Monitoring and Program Evaluation Plans

Fidelity monitoring and program evaluation plans are developed during the Preparation Phase of the EPIS framework, put into action during the Implementation Phase and monitored in an on-going, cyclical manner during the Sustainment Phase. These plans are monitored and evaluated on a regular basis by members of the Steering Committee, with a focus on EBP implementation fidelity, processes outcomes, and dental health outcomes. A fidelity monitoring plan in conjunction with a program evaluation plan include requirements for on-going documentation of successes and challenges during implementation which informs a feedback loop for continuous improvement.

Implementation fidelity is the degree to which an intervention is delivered as intended. Implementation science research indicates that the manner in which an EBT is implemented can affect the intended future successful expansion of a program. Lack of, or diminished implementation fidelity, can have a deleterious impact on the intervention outcomes. When a program is implemented with high fidelity, it improves the likelihood that intended program effects are replicated faithfully as the program is expanded into other locations (Agency for Children and Families, 2012; Breitenstein, 2010).

When an EBP is implemented, over time it is anticipated that practitioners might inadvertently modify program procedures or activities, which is referred to as "drift" (Walsh et al., 2015). This phenomenon is less likely within the context of a clinical procedure, versus an educational or behavior change intervention, due to the scrutiny imposed by clinical treatment protocols, however it is still possible and needs to be planned for. Further, there are essential programmatic and administrative elements to SBSPs that could more likely "drift" as staff achieve mastery of and comfort with the program procedures and adherence to implementation guidelines relaxes (Breitenstein, 2010). It is also expected that locally appropriate modifications to procedures may occur. Through fidelity

monitoring, these "adaptations" should be collected, considered and incorporated into program policies, procedures and protocols if acceptable.

A fully formed fidelity monitoring plan will be heavily reliant on experienced program staff at the state and local level who have thorough understanding of the program. There are publicly available tools that include various options for collecting self-reported information, audio or video recordings or optimally through direct observation. Each of these methods have inherent advantages as well as limitations and should be used complementarily versus relying on one approach alone. Use of process and outcome measures are also helpful when comparing actual to expected performance based on past experience. In addition to facilitating future versions of the program, results of fidelity monitoring directly inform future training needs for program and clinical staff.

The evaluation plan will encompass two standard programmatic areas; process measures and outcome measures. Process measures are currently collected by state dental program staff. During the development of this plan in the Preparation Phase, these measures will be reviewed and potentially revised, but it is likely that the current set of metrics is comprehensive. Data elements for process measures will include:

- Number of children served, and other aspects related to the procedure such as length of time to complete, time away from instruction, etc.
- Number of sealants placed per child per event.
- Number of referrals made to dentists for acute care.
- Number of referrals completed (note: this is difficult to collect within the current system).

Additional data collection will be planned through follow up satisfaction surveys of both school personnel and the parents of children who received the services. It is possible that surveys will be distributed to samples of participants.

Outcomes metrics to be included in the evaluation plan will be the same sources utilized in the needs assessment; school level absentee data, school level academic performance (the Georgia College and Career Ready Performance Index – CCRPI), and ambulatory care sensitive conditions for acute dental health treatments in emergency room settings as described in Recommendation 2. Each of these are a proxy for student specific outcome data collected directly from the SBSP participants,

however, a before and after, year-over-year trend analyses for the expansion schools that would speculatively show positive trends, especially if participation by the student population in SBSPs is maximized.

The proposed proxy data sources are web-accessible and at no-cost. It is possible and even advisable that follow up surveys be conducted with the parents of children that receive the services to determine accurately if the recipients follow through on referrals, experienced caries on treated teeth, or missed school due to dental health issues. This level of effort is time consuming and would require additional staff resources but should be considered of funds become available.

As with previous recommendations, the author will be available during the Preparation Phase to work with members of the steering committee to conduct the planning for fidelity monitoring and program evaluation. The author has experience in developing and managing evaluation plans that has direct applicability to this recommendation and would work with the steering committee to bring the resources needed to complete fidelity monitoring planning. These activities occur before decisions are made about moving into the implementation phase.

5. Conduct a financial analysis

A comprehensive financial analysis is a fundamental component of a complete policy proposal and is an activity initiated in the Preparation Phase of the EPIS implementation framework which continues into the Sustainment Phase. Expansion of SBSP into additional elementary schools, even if just a single school district, will increase direct costs to the system for supplies, travel time, and staff salary, etc., for which there are currently no funds available to support. Recommendation 5 of the PFC is to conduct a financial assessment that is sufficient for a policy argument in support of expansion in the form of a state budget appropriation.

During the legislative cycle, a proposal or request for an appropriation for the expansion of a program such as SBSP could follow one of several paths. The governor's office could invite a state agency to request state funds, but this is rare and unlikely to occur in the near future. Questions typically arise in discussions with appropriators in the General Assembly in both the House of Representatives and the Senate during the budget cycle. In the event a question is asked of leadership

about agency needs, state agencies are normally prepared with a prioritized set of formal proposals referred to as “white papers”. Unfortunately, this is also unlikely to occur in the near future, and pursuit of an option initiated on this path would require the alignment of leadership of both GaDPH and GaDOE and permission from the Governor’s Office to proceed. Regardless, this recommendation will culminate in the completion a high-level, policy white paper to be ready in the event of a potential opportunity to submit a proposal during a future budget cycle. The analysis will cover the following topics:

1) The need for dental health intervention at the school level will be described using data and information from this research.
2) Cost effectiveness of Sealants and SBSP as a delivery program will be outlined as it has been for this dissertation.
3) The direct costs of the program including salary for hygienists, dental assistants and dentists, equipment, supplies and travel will be described. The analysis will take existing local public health program experience into account for items including optimal ratios of providers per school. However, there will not be a one size fits all due to variability among public health districts in the number of school districts and elementary schools, travel distances, relative salary costs (urban vs rural) and options for hiring staff dentists versus contracting for supervisory requirements.
4) The administrative, or indirect costs, will include staff salaries for augmenting management, training and quality assurance, billing and additional staff and systems for fidelity monitoring program evaluation activities.
5) Income from billing Medicaid and potentially other commercial insurance providers will be projected using inputs from years of experience with the SBSPs currently in place. While billing is currently conducted, it is not a priority in all locales due to administrative burden. This income stream is not sufficient for complete cost recovery, but can be a viable fund stream.
6) The long-term value of the program to the student, the school and to society, including reduced absenteeism and improved academic performance at the school level, fewer lost days

of work for parents will be measured. These "costs" are understood but will be less tangible, but the life-long economic impacts for the child must be included.

The author has career experience in policy development, working with inter-agency partners, and possesses a deep understanding of program implementation within the state-wide public health governance infrastructure. Additionally, the author has participated in the development of multiple white papers during years of budget cycles, experience which can be applied to efforts delineated in this Recommendation. With clearance from the agency leadership and at the request of GPHDP, the author is available to participate in the assessment with the Steering Committee.

Additional Actions

The author will attempt to publish research findings in peer reviewed journals to expose what was discovered as a gap in the literature about SBSP adoption determinants, and the awareness of school-based sealant delivery programs to prevent dental health issues. Additionally, the author will endeavor to share the findings from this research at the regional and national levels and take advantage of opportunities to present findings and recommendations at meetings and conferences.

The author's organization supports this work and will likely approve of presentations in various formats to share the results of the dissertation, however there are limitations in that the organization is not an implementor of SBSP and is a governmental agency with precautions regarding advocacy. The plan for disseminating findings at state or national meetings also has limitations. Primarily, entities have the authority to approve or deny manuscripts for publication and presentation. Additionally, the number of individuals reached is highly dependent upon attendance.

In addition to promoting the research results, the author will take steps to engage with public health organizations at both the national and state levels. Suggested organizations include but are not necessarily limited to the Association of State and Territorial Health Officials (ASTHO), the National Association of City and County Health Officials (NACCHO), the Trust for America's Health (TFAH) and the Association of State and Territorial Dental Directors (ASTDD). Furthermore, the Community Preventive Services Task Force described a gap in the research that called for future studies that "describe methods by which schools are recruited and programs are implemented" (Community

Preventive Services Task Force, 2013). The author will work with professional contacts to connect the Task Force with this research. Finally, the author will engage with state level organizations including the Georgia Public Health Association, the Georgia Dental Hygienist Association, the Georgia Association of School Nurses and the Georgia School Superintendents Association and others to disseminate the results.

Conclusion

Too many children go without the preventive dental health services that would reduce the incidence of caries and consequently reduce school absenteeism. In one third of the 18 schools in this study there were no dental programs of any kind. This equated to 1,091 elementary school children who did not have even minimal exposure to dental health content while at school, 72% (N = 782) of whom were FRPM participants. Some of the dental health programs follow an acute care model and only apply sealants when the opportunity presents. Many are education only, and few are the population-based sealant delivery programs of interest in this research that are designed to prevent acute dental health issues.

There is a clear opportunity to expand the adoption of SBSP across the state and provided the resources public health is well suited to the role. Principals across both cohorts recognized the need present in their student bodies and frequently acknowledged the school was an obvious choice for hosting extracurricular healthcare programming, with the stated knowledge that some children may not receive the service otherwise. Finally, many principals who did not have an SBSP in their school indicated they would adopt an SBSP if they were offered the opportunity. Effective application of dental sealants at school in the children with the greatest need should be part of a comprehensive solution to addressing dental health disparities in children.

APPENDIX 1: LITERATURE REVIEW ABSTRACTION DATA

Lead Author Year	Study Design	Study Population	Sample Size	Analytical Methods	Author Conclusions	Quality Rating
Coombs 1980	2 part mailed survey	Public school Superintendents, program administrators	15,024 (75% overall response rate)	Descriptive stats and for X^2 significance	Preliminary findings; conditions for acceptance by institutions of new health measures must be understood if preventive health measures are to be successfully adopted.	High
Silversin 1980	2 part mailed survey	Public school Superintendents, program administrators	15,024 (75% overall response rate	Descriptive stats and for X^2 significance	Determinants to adopt include attitudes and perceptions, Influencers	High
Coombs 1981	2 part mailed survey	Public school Superintendents, program administrators	15,024 (75% overall response rate	Descriptive stats and for X^2 significance	The innovations were "pushed" into the school rather than pulled based on a perceived need. A school is a logical site for addressing child heath.	High
Deatrick 1982	Mailed Survey	Maine Public and Private School Superintendents	145 Public Supers 63 Private Principals	Mailed survey, proportions and descriptive statistics	Knowledge of attitudes about FMRP is essential so PH officials can be more effective, precise in efforts to promote.	Medium
Coombs 1983	2 part mailed survey	US School Superintendents	15,024 (75% response rate)	Surveys, Descriptive stats and for X^2 significance	School health personnel pay a key role in influencing adoption decisions	High
Scheirer 1987	2 Part Telephone Survey	US School Superintendents	1,072 (75% response rate)	Descriptive	Attitudes of adopters and the influence of champions and health related personnel	High
Scheirer 1990	2 Part Telephone Survey	US School Superintendents	1,072 (response rates - 76% for adopters, 70% for non-adopters)	Backwards, stepwise regression analysis	The key process is the presence of strong interpersonal influence to guide the decision process to adoption.	High

APPENDIX 2: INVITATION EMAIL TO STUDY PARTICIPANTS

Dear Principal _____,

Elementary schools have the potential to positively contribute to the dental health of their students. I am writing to invite you to participate in a research study that aims to understand a school's involvement in a cost-effective program that delivers dental sealants to prevent tooth decay, a major cause of absenteeism and poor academic performance in children. I am conducting this study to meet dissertation requirements as a doctoral candidate in the Gillings School of Global Public Health at the University of North Carolina at Chapel Hill.

The aim of this study is to determine what influences a school's decision to participate in a school-based sealant program (SBSP). Your school's involvement in an SBSP is not required for participation in this interview. Benefits of this research include the development of practice-based recommendations to increase awareness of and participation in SBSP and sharing findings regarding the potential of schools to participate in the prevention tooth decay.

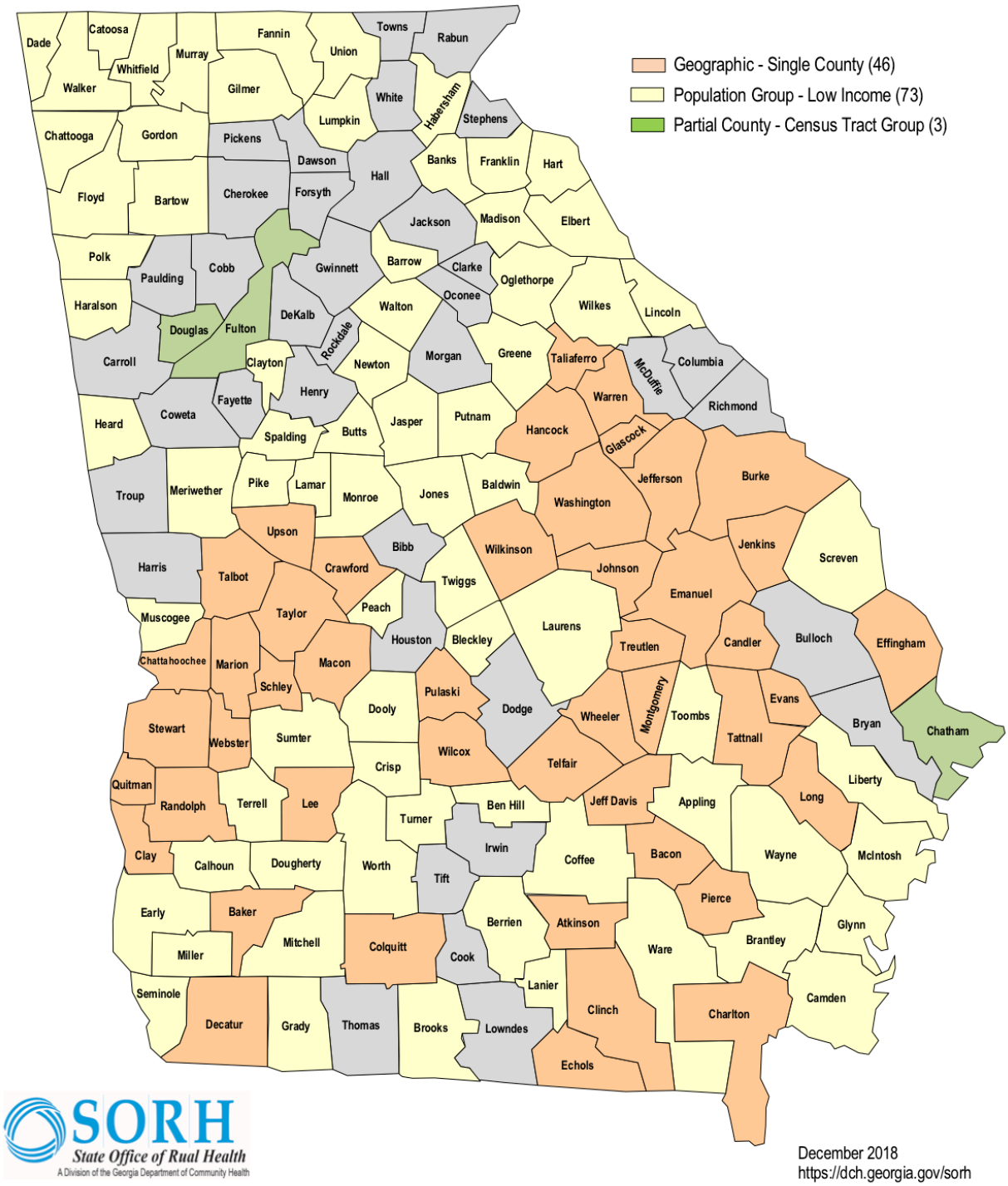
If you would like to participate, I will schedule a 45-minute telephone meeting with you based on your availability. During this meeting, I will ask you questions about your awareness of and your school's involvement in school-based sealant programs. Eligible participants for this interview are elementary school principals, due to your decision-making role related to adoption and implementation of health programs.

Participation in this study is voluntary and confidential. Your name will not be used and the school where you work will only be discussed in broad terms, not referenced by name. Direct quotes may be used in the final dissertation; however, such quotes will not be attributed to your name, school name, or any other identifying characteristics.

Please let me know if you are willing to participate in this study, and if so, who I can work with to schedule a meeting.

Thank you,
James Howgate

APPENDIX 3: DENTAL HEALTH PROFESSIONAL SHORTAGE AREAS



APPENDIX 4: KEY INFORMANT INTERVIEW GUIDE

Date: _____
School Name: _____
Key Informant: _____

The purpose of this interview is to understand what influences decisions made by public elementary school principals regarding adoption of school-based sealant programs (SBSP). This interview will take no more than 45 minutes and this conversation will be kept completely confidential. Your name will not be shared or released in any format and will not be linked to any of your responses. Information that you share will be released in summary format or combined into general themes with information from other interviews. The school where you work will not be listed by name, but instead will be generically referred to as "an elementary school".

I would like your permission to record our interview, which will allow me to capture information shared more accurately than taking notes. Audio files and transcripts will be held in a password protected, confidential file and will be destroyed at the end of the research study.

AIM 2 - School Principals that HAVE Adopted a School-based Sealant Program

1. Do I have your permission to record the interview?
   Begin recording the interview.
2. Do you have any questions about this research study before we begin?
3. Do you consent to participate in this study?
4. May I ask how long you have been the principal at your school?
5. May I ask what your educational level is?
6. I would like to confirm my understanding of some demographics and data about your school so you can correct me if anything is mischaracterized.
   a. School name, system name.
   b. Enrollment demographics (total enrolment, by sex, race, ethnicity, etc.).
   c. Level of Free and Reduced Priced Lunch (FRPM) program participants.
7. In your role as the school principal, when you are presented with a new, extra-curricular program for your students, what are your initial thoughts? (Innovativeness, complexity, competing priorities)
   a. Probe: Can you tell me more about that?
   b. Probe: additional probes will be based on statements made by the principal, e.g. who is involved; how much time does that take; what kind of data or information do you need before moving forward?
8. What if the program is presented as apparently beneficial for your students? (perceived need, competing priorities)
   a. Probe: Can you tell me more about that?
   b. Probe: additional probes will be based on statements made by the principal, e.g. who is involved; how much time does that take; what kind of data or information do you need before moving forward?
9. My records indicate that you've had a School-based Sealant Program for the school years _____, is that accurate?
10. What were your thoughts about SBSP? Note: of interest is what comes first in their answer; primacy (awareness, targeting, risk reduction, complexity, resistance, perceived need, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: during your process for deciding to have an SBSP, what kinds of things were going through your mind? (targeting, complexity, risk reduction)
    c. Probe: additional probes will be based on statements made by the principal.
11. What, if anything, influenced your decision? (targeting, risk reduction, resistance, perceived need, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: Were school health or public health professionals involved? Advocacy groups? (targeting)

c. Prove: Who, if anyone, influenced your decision? (if not addressed above)

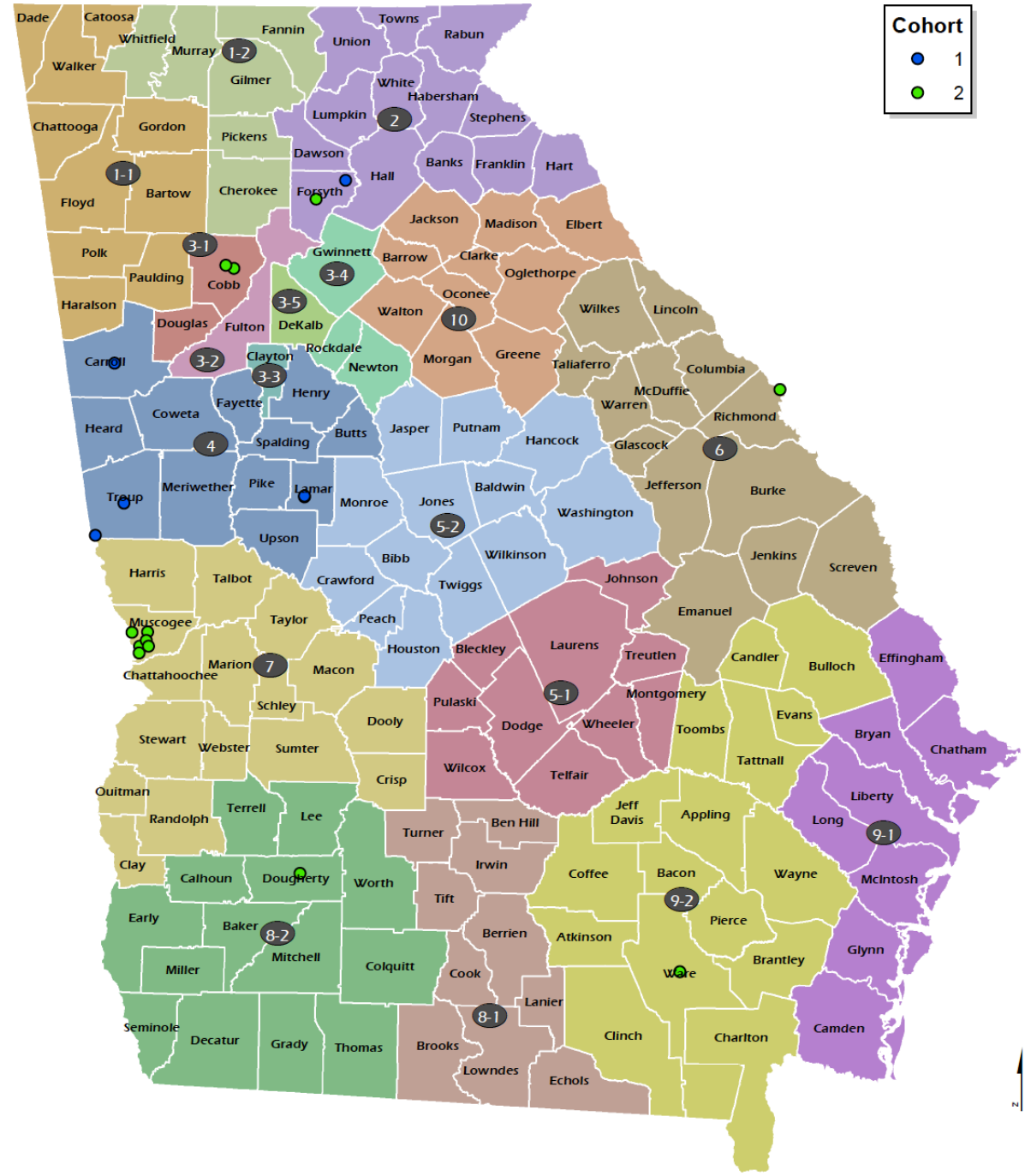
12. What other considerations did you have, If any? (complexity)
    a. Probe: Can you tell me more about that?
    b. Probe: What about program logistics? Funding? Staffing? Physical space?
    c. Probe: Was access to dental services in your area a consideration?
    d. Probe: Did you discuss health care coverage of your students?
13. What if anything made the decision to adopt the program attractive to you? Note: of interest is what comes first in their answer; primacy. (risk reduction, perceived need, competing priorities, resistance)
    a. Probe: Can you tell me more about that?
    b. Probe: Can you help me understand what you mean by that?
    c. Probe: Additional probes will be based on statements made by the principal.
14. What concerns if any did you have if any about implementing in your school? (complexity, risk reduction)
    a. Probe: Can you tell me more about that?
    b. Probe: Can you help me understand what you mean by that?
    c. Probe: Additional probes will be based on statements made by the principal.
15. During the decision process, what if anything got in the way of making the decision? (resistance, complexity)
    a. Probe: Can you tell me more about that?
    b. Probe: What about anyone outside your school?
    c. Probe: What about anyone inside your school?
    d. Probe: What, if anything, do you wish had been different about how the decision was made?
16. Do you have any thoughts about why some schools and some schools do not adopt SBSP?
17. Before we wrap up, is there something else that you would like to add?
18. Do you have any suggestions for other elementary school principals who might like to be interviewed for this study? (Snowball Sampling)

<u>For School Principals that HAVE NOT Adopted a School-based Sealant Program</u> (Aim 3)

1. Do I have your permission to record the interview?
   Begin recording the interview.
2. Do you have any questions about this research study before we begin?
3. Do you consent to participate in this study?
4. How long have you been the principal at your school?
5. May I ask what your educational level is?
6. I would like to confirm my understanding of some demographics and data about your school so please correct me if anything is mischaracterized.
    a. School name, system name.
    b. Enrollment demographics (total enrolment, sex, race, ethnicity).
    c. Level of Free and Reduced Priced Lunch (FRPM) program participants.
7. In your role as a school principal, when you are presented with a new, extra-curricular program for your students, what are your initial thoughts? (Innovativeness, complexity, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: Additional probes will be based on statements made by the principal, e.g. who is involved? How much time does that take? What kind of data or information do you need before moving forward?
8. What if the program is presented as apparently beneficial for your students? (perceived need, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: Additional probes will be based on statements made by the principal.
9. My information indicates that you have not had an SBHP in the past school year, is that correct? (awareness)
10. Can you describe any other dental health related services conducted in your school?

11. Have you ever been presented with a proposal to adopt an SBSP? (awareness)
Note: If 'yes' and rejected, text in (parenthesis) for following questions indicate syntax modifications.
12. What are your thoughts about SBSP? (targeting, complexity)
    a. Probe: Can you tell me more about that?
    b. Probe: Additional probes will be based on statements made by the principal.
13. If (when) you were offered to have an SBSP in your school, in your process for deciding to have an SBSP, what kinds of things would go (went) through your mind? (targeting, complexity, perceived need, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: Additional probes will be based on statements made by the principal.
14. What if anything influenced (would have influenced) your decision? (resistance, targeting, risk reduction, perceived need, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: Were there (would there be) school health or public health inputs?
    c. Probe: Was (would) an advocacy group (be) involved?
    d. Probe: Who else, if anyone, would you involve?
15. What other considerations did (would) you have, If any?
    a. Probe: Can you tell me more about that?
    b. Probe: What about program logistics? Funding? Staffing? Physical space?
    c. Probe: Was (would) access to dental services in your area be a consideration?
    d. Probe: Was (would) access to health care coverage of your students (be) a consideration?
16. What, if anything, would make the decision to adopt the program attractive to you? Note: of interest is what comes first in their answer; primacy. (risk reduction, perceived need)
    a. Probe: Can you tell me more about that?
17. What would concern you, if anything, about adopting an SBSP in your school? (risk reduction, resistance, complexity)
    a. Probe: Can you tell me more about that?
    b. Probe: Additional probe not needed
18. During the decision process, what, if anything, got in the way of making the decision? (resistance, complexity, competing priorities)
    a. Probe: Can you tell me more about that?
    b. Probe: What about anyone outside your school?
    c. Probe: What about anyone inside your school?
19. Do you have any thoughts about why some schools do and some schools do not adopt SBSP?
20. Before we wrap up, is there something else that you would like to add?
21. Do you have any suggestions for other elementary school principals who might like to be interviewed for this study? (Snowball Sampling)

APPENDIX 5: MAP OF PARTICIPATING SCHOOLS



APPENDIX 6: URBAN-CENTRIC LOCALE CATEGORIES

NCES's urban-centric locale categories, released in 2006 https://nces.ed.gov/surveys/ruraled/definitions.asp		
(11)	City, Large	Territory inside an urbanized area and inside a principal city with population of 250,000 or more.
(12)	City, Midsize	Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000.
(13)	City, Small	Territory inside an urbanized area and inside a principal city with population less than 100,000
(21)	Suburb, Large	Territory outside a principal city and inside an urbanized area with population of 250,000 or more.
(22)	Suburb, Midsize	Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000.
(23)	Suburb, Small	Territory outside a principal city and inside an urbanized area with population less than 100,000.
(31)	Town, Fringe	Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area.
(31)	Town, Distant	Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
(33)	Town, Remote	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
(41)	Rural, Fringe	Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
(42)	Rural, Distant	Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from
(43)	Rural, Remote	Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

APPENDIX 7: CODES APPLIED TO TEXTUAL DATA TO DEVELOP THEMES

Deductive Codes	
Targeting	How well the SBSP does in making the case to adopt a new program.
Risk Reduction	The effect of the SBSP taking the risk of conducting the entire program away from the school.
Complexity	The principal's attitude towards the program including effectiveness, cost, funding availability and the degree of difficulty to conduct a program.
Innovativeness	A principal's predisposition to attempt new initiatives.
Resistance	The degree to which internal and external individuals or entities negatively influence the decision to adopt.
Perceived Need	The level of influence of the principal's felt need for an intervention, possibly based on poverty level or knowledge of disease burden.
Competing Priorities	The level of influence of the principal's lack of motivation to adopt, based on limited resources or external or internal pressures.
Awareness	A condition necessary for the adoption decision to occur which can be influenced by targeting.
Education Level	The highest degree achieved and the topic of research for the degree if applicable and if this is correlated to an adoption decision.
Inductive Codes	
Decision Process	The process of the decision, which includes components such as the people and their roles and the general maturity and formality of the process.
Barriers	Barriers was initially reacting to barriers that the parents had to getting care. Minimizing the burden like filling out forms.
Access to Care	The concept that the adoption decision as driven by an awareness that there is no other source or sources for the service or are very limited other than at the school.
Influences	Individuals, entities, data, information or experience that plays a role in affecting the decision to adopt.
School Culture	An informant's reference to the general or personality of the school or a need to change the culture in order to achieve a goal.
Whole Child	A perspective focused beyond the immediate educational achievement of the child to include general and emotional health, behavioral health and relationships components affecting future success.

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